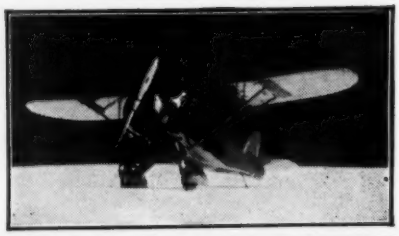
MODEL AIRPLANE NEWS

JUNE
1935
20c
Canada 25c

Grumman Fighter FF-1



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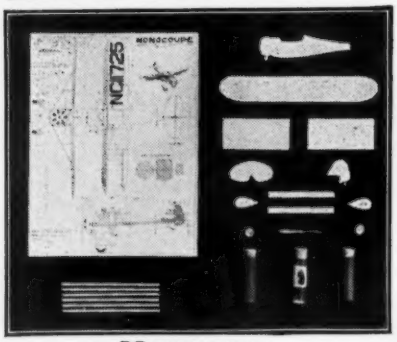
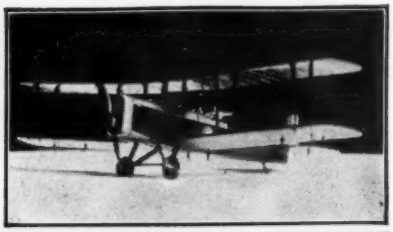
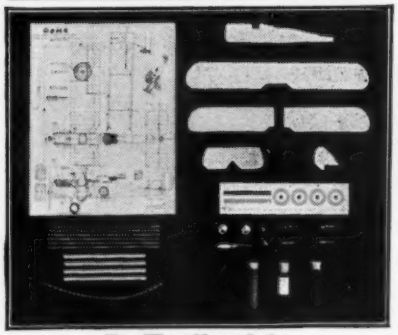
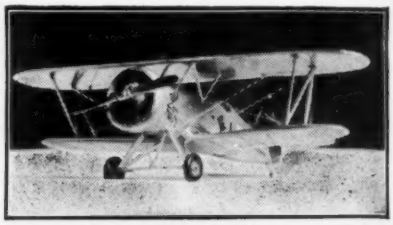


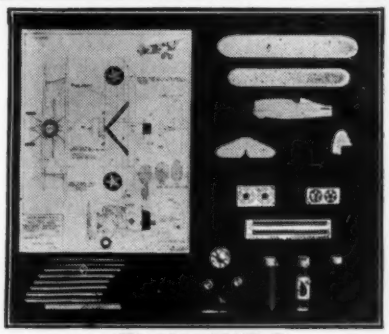
Monocoupe





De Haviland 4





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Curtiss Swift
Nieuport 28
Supermarine
Halberstadt
Hawk P-6-E
Navy Racer
S.E.5A
Fokker D7
Fokker D8
Pfalz D12
Hawk P-5
Albatross
Pfalz D3
Autogiro
Spad 13
B/J 16 Camel
DeHaviland 4
DeHaviland 5
Monocoupe
Vought V65

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BOEING TRANSPORT

BOEING BOMBER Y1B-9A

Now you can build the Boeing Transport or the Boeing Bomber pictured here and have an exact ¼ inch scale replica model for $1.65

The kit sets contain all the wood parts cut to outline shape, two scale die cast Wasp Motors, two scale die cast three bladed propellers, all ready to mount, and cast wheels. These castings are made of Brittania metal and do not have to be hand finished. A full size 18½ inch wing span plan, glue, paint, etc., comprise the kits. When you consider that the fuselage, wings, rudder, and elevator are cut to shape and NOT blocks of wood, motors and propellers are ready to mount, and the size of the plane, 18½ inch wing span, you will realize we have produced a construction set that is in a class by itself. We guarantee these kits to be as stated, and know you will be satisfied.

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Send 10c for illustrated catalogue. Dealers write for prices.

7th YEAR OF PUBLICATION

VOL. XII *NO. 5*

Edited by Charles Hampson Grant

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JUNE, 1935

Cover Picture—By Josef Kotula

NRA MEMBER U.S.

WE DO OUR PART

In Our Next Issue

We present an interesting surprise, the first article of several to be published, entitled **Sopwith Airplanes of The World War**, by W. E. R. Puglisi. Plans of these ships are a feature of the articles.

Plans for an excellent flying scale model of the latest U.S. Navy fighter, in **Building a Model of the New Curtiss Fighter**, by William Winter and Walter McBride.

Jesse Davidson presents patterns for a silhouette glider of the Stinson Cabin plane in **Something to Build for Beginner or Expert.**

Fletcher Pratt, in **The Glider Grows Up—Part No. 2**, tells of the development of the modern highly efficient glider and its use to aviation.

The Third Airplane Observers Contest will provide fortunate winners with useful awards.

Building a Light Weight Outdoor Tractor, by Gilbert MacLean shows the average model builder how to make a simple, but an unusually fine flying double surfaced wing model.

There will be many other features of interest, as; **Detail Plans of the D.H. 5, On the Frontiers of Aviation, How to Make Clark "Y" Wing Sections, Air Ways, Slipstreams, N.A.A. Junior Membership News, The Aerodynamic Design of the Model Plane, and the Aviation Advisory Board.**

Order your copy of MODEL AIRPLANE NEWS from your newsdealer now or send $1.65 for your year's subscription to this office, 551 Fifth Avenue, New York City. Canadian subscriptions $2.50 per year. All other countries, $2.50.

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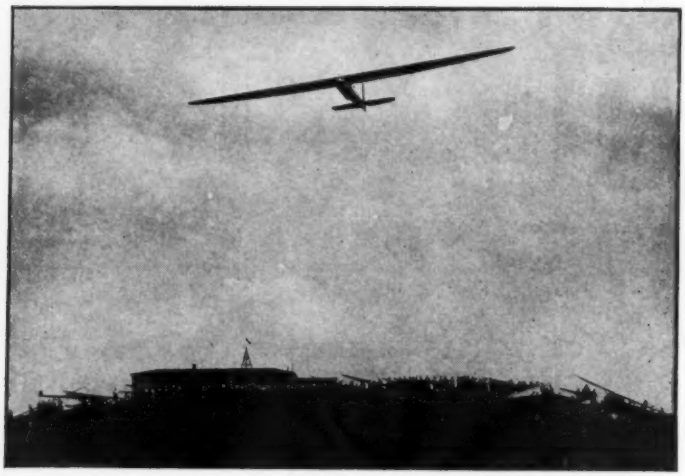


A Condor soaring glider after launching from the Wasserkuppe

The Glider Grows Up

The Development of the Glider—How Glider Experiments Have Been Responsible for Improvements in Airplane Design and How Powerless Planes Have Proved an Invaluable Means of Flight Instruction

By FLETCHER PRATT

PART ONE

MOST aviation enthusiasts regard the glider as a kind of poor cousin of the airplane. The real dyed-in-the-wool glider fan, however, looks at things from just the opposite direction. When you tell him that Jimmy Doolittle has just crossed the continent in record time, he lifts his nose slightly and remarks, "Yes, but did you see what Du Pont did with his soarer," and goes on to tell you that flying with a motor is just an expensive and unskillful method of gliding.

Whether you like it or not there is a good deal in what he says. It is perfectly true that the airplane was born as the result of glider experiments, and the best airplanes are in a sense, nothing more than powered gliders. That is, if they don't have the qualities of good gliders they are not good airplanes. It is also true that nearly all the major improvements in airplane construction since the war can be traced to the results of glider flying, both model and full scale gliders. And pilots who have taken their preliminary training on gliders turn out the best pilots—both in Russia and Italy boys and young men qualify for the aviation service by studying and flying gliders.

From this point the glider men will go on to say that they hold the future of aviation. They point out that the powered airplane has realized most of its possibilities. We can expect improvements in reliability, size, power and speed, but these will be obtained by bringing the general average of planes up to records already set by special models, not a matter of greatly increasing these records. For instance, some day commercial planes will make regular runs as long as Codos' flight from New York to Syria, but there would be little use in having a commercial plane that would fly further than that. On the other hand, the glider people tell us that one of these days you will be able to take off from the roof of a New York skyscraper with a glider and fly to Boston or Philadelphia, nonstop, and without a motor; they say that great aerial trains of a dozen or more gliders, each with its cargo of passengers, will soar across the continent behind a single-powered machine, and they point out that when this comes, gliding will be the cheapest, fastest and safest method of transportation yet invented.

A glider can land, practically, on a pocket-handkerchief, and with the aid of an automobile shock-cord and automatic release, could take off from a city street. But that's getting ahead of the story.

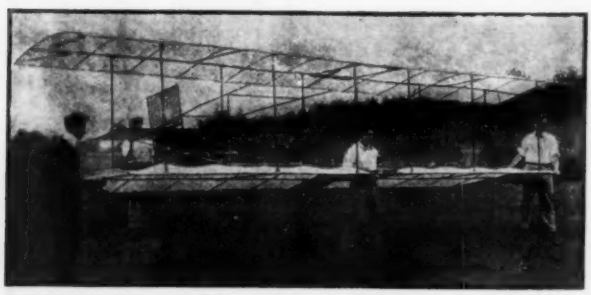
There are four main types of gliders; the primary training glider, which is the school machine; the advanced trainer or "Prüfling"; the soarer, or sailplane, which makes long distance flights and which has set all the modern records; and the dynamic soarer, which hasn't been invented yet, but toward which the glider technicians are steadily and certainly working.

In the early days of aviation there was a fifth type—the "hang" glider, the true father of the airplane. It is called "hang" because the aviator hangs upright in some sort of rack so that his feet form the landing gear, and makes turns by swinging the weight of his body from side to side.

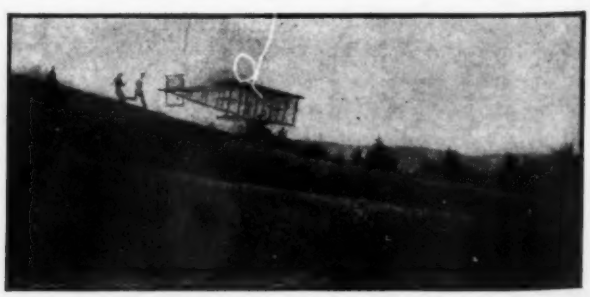
The earliest recorded glider was of this type, and was invented by the painter, Leonardo da Vinci, in the fifteenth century. It was a fearsome contraption of wires and wings, looking like an umbrella gone crazy. The inventor was too clever to try it out himself, but one of his assistants jumped off a tall column in Rome with it. It glided beautifully for about ten feet, then stalled, collapsed and crashed, and gliding was not heard of again until Lilienthal took it up in Germany and Montgomery, Chanute and Herring in America, in the 1890's.

Lilienthal built his glider on the principle of the very lightest possible wing. He designed after the bat; the wings were a membrane stretched across the supporting ribs, which rayed out from a center near the flyer's body. There was a fin and an elevator, both set permanently and carried on an outrigger at the back. When he wanted to soar, Lilienthal ran across the top of a hill and launched himself into the air in a headwind. It worked after a fashion, but there were at least three wrong principles involved and it is not surprising that Lilienthal was killed in a crash resulting from a stall and a collapsed wing.

The three Americans worked together more or less. Montgomery used a double-monoplane hang glider with each wing supported on a pair of longerons, and launched himself from a balloon 1000 feet up. He made several successful flights and then, like Lilienthal, died of insufficient wing bracing. After this, Chanute and Herring



A Chanute-type hang glider, built and flown in 1912 by C. H. Grant. Note the absence of ailerons and landing gear



The start of a flight by C. H. Grant in a Chanute-type glider which had been equipped with ailerons and skids (1913)

A secondary training glider with a nacelle

A primary training glider in full flight

turned to biplane hang gliders used from hilltops. By using biplanes they avoided the fate of their predecessors, but they also got poor performance, and it was not till the Wrights and their experiments at Kitty Hawk that the difficulties were met. (A typical hang glider is shown in one of the accompanying pictures.)

Everybody knows the story of the Wrights and how they invented the airplane, but it is important to the story of the glider to remember that they were the first to abandon the hang principle, the first to introduce ailerons and other control surfaces and the first to have any idea of the importance of wind resistance. The very first Wright glider had a skid landing gear, with the flyer lying on his stomach operating the controls; out in front of him was a stabilizer on an outrigger. We shall see later how glider technique has worked around again to this idea after all the years between.

The Wrights carried on their airplane experiments by building gliders, which were flown as such, then given powerplants to become airplanes. In 1911, before they put an engine in it, their last glider established a duration record of 9 minutes, 40 seconds. That record stood for seventeen years.

The reason was that the airplane proved a success. In 1912, an American firm, the Witteman Brothers, produced a glider on a commercial basis. It was a hang glider, very much the same sort of instrument Chanute and Herring had used, and it quickly disappeared as flying with a motor gained popularity. In fact, nobody thought of the glider again till after the World War. It was felt that the glider's purpose had been served.

The peace treaties, however, forbade Germany to build airplanes at first. Now there were a number of young flying enthusiasts in Germany, some pilots and some not, who refused to let their enthusiasm be dampened by a little thing like not being allowed to have airplanes. They formed a society and gathered around the Wasserkuppe hill in the mountainous, but rather treeless Rhön district, to fly with gliders. It was a remarkable group, including practically all the men who were to become the leading aviation designers of the new Germany—Lippisch, Georgii, Heinkel, Klemperer, Madelung.

Almost immediately they discovered that there was more to be learned about gliding flight than anyone had realized. It turned out to be one of the world's best sports, and besides, it enabled them to make contributions of the highest value to aviation.

Few of these contributions were absolutely new, in the sense of ideas nobody had ever thought of before, like Cierva's autogyro. They had all been discarded as either unworkable or unimportant. It would take too long to go into the history of each new device or development, or to tell of the various ingenious schemes that were tried and discarded. Progress was rapid, especially at the beginning. An experimenter would have a bright idea today; tomorrow he would appear with a small model and try it out; and on the third day would be flying a full-sized glider with the new gadget incorporated. So let's stick to the main developments.

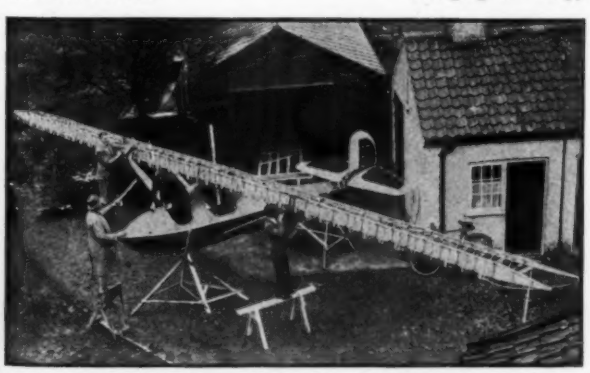
One of the first things the young Germans discovered was that the hang glider was no good. It tied up the pilot's arms so that the only method of control was swinging his body, which was both slow and inefficient, and for another thing, it became a positive danger at landing time, resulting in many a sprained ankle and smashed glider wing. After 1919, the hang glider disappeared entirely, to be replaced by the type in which the operator sits and works a stick control, with a skid or wheel landing gear.

The experimenters also found, quite early in the game, that the reason previous glider men had made such poor performance was their insistence on biplane gliders. A biplane is all right as long as it has a motor which will give it a powerful thrust to overcome the drag of struts and wires, but when you have no power, that drag becomes a serious matter; or, in other words, the L/D ratio of a glider *must* be high. Moreover, a biplane doubles the wing-tip loss of efficiency, which again is not serious while you have a motor to give you thrust. Therefore, the Germans reasoned, a monoplane must be developed if they were to make any improvement at all on the records of Chanute and Herring.

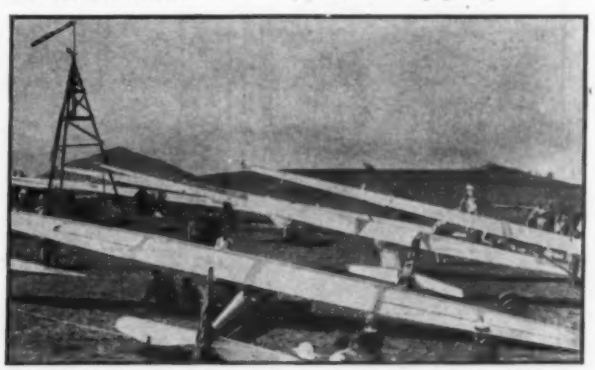
The important thing about this is the date: it was just after the war, during which all the authorities had agreed that the monoplane was gone for good and all. It had not stood the test of war experience; everyone was building biplanes or triplanes. The only monoplanes being built were a few Morane parasols and these were regarded with perfectly justified suspicion as fragile ships, beside which their forest of bracing wires gave almost as much drag as a biplane system.

The German glider men, then, were faced with the problem of finding some new principle of monoplane construction that

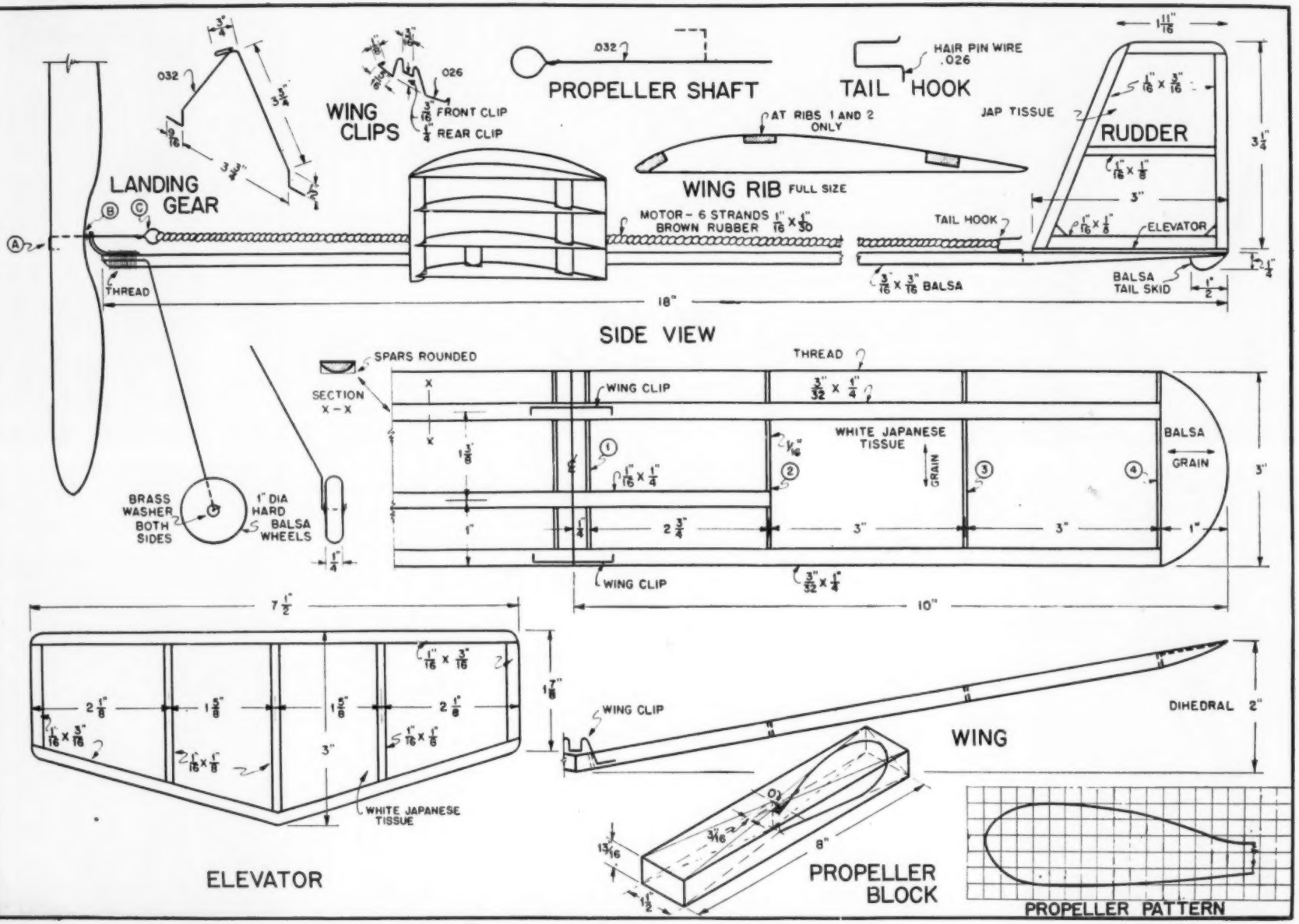
(Continued on page 43)

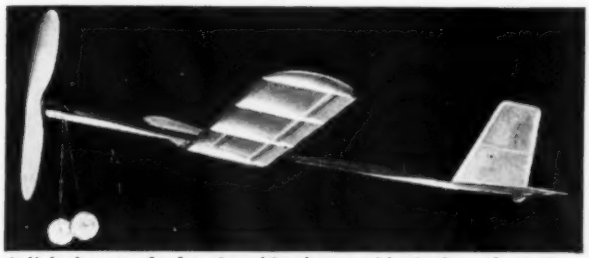


A two-passenger training glider being built by members of the Norfolk and Norwich Gliding Club

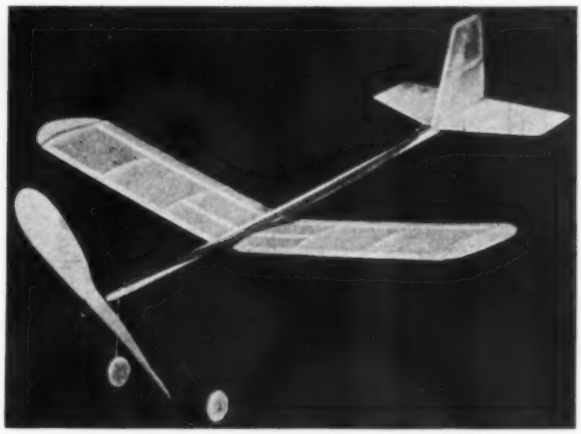


Soaring gliders waiting for a breeze at a contest on the Wasserkuppe, Germany


LANDING GEAR
032
WING CLIPS
026
FRONT CLIP
REAR CLIP
PROPELLER SHAFT
TAIL HOOK
HAIR PIN WIRE .026
AT RIBS 1 AND 2 ONLY
WING RIB FULL SIZE
JAP TISSUE
RUDDER
ELEVATOR
MOTOR - 6 STRANDS 1" x 1/30 BROWN RUBBER
THREAD
3/16 x 3/16 BALSA
BALSA TAIL SKID
18"
SIDE VIEW
SECTION X-X
SPARS ROUNDED
WING CLIP
WHITE JAPANESE TISSUE
GRAIN
BALSA
BRASS WASHER BOTH SIDES
1" DIA HARD BALSA WHEELS
10"
7 1/2"
3"
WHITE JAPANESE TISSUE
ELEVATOR
WING
DIHEDRAL 2"
PROPELLER BLOCK
8"
PROPELLER PATTERN



A light but sturdy duration ship shown with single surface wing covering. The spars are rounded on the bottom



A Plane That Is Easy to Build and Fly

By GILBERT MacLEAN

Here's How You Can Build a Combination Single or Double Surface Paper-Covered Model That Will Fly One and One Half Minutes Indoors or Outdoors

THERE are many model builders who enjoy the thrill of flying models rather than merely constructing them. Many of these are builders with a fair amount of experience, but who do not classify themselves as experts. Perhaps they have made many successful all-balsa models, but have found the operation of covering fuselages and wings with paper quite difficult. We are presenting this very simply constructed, but excellent flyer for such model builders. It is a ship which does not involve complicated paper covering; it is just the right type upon which to start your experience with paper-covered models.

The flight of this little ship is fine enough to intrigue the most expert builders. It will take off the ground within one or two feet and fly for a minute and a half, or more, indoors. Outdoors the flight is unlimited. On several occasions it has risen to great altitudes and was only retrieved after following it for a great distance. It is one of those models that will fly upon every trial and is not in the least cranky.

We suggest that you younger builders start your experience with paper-covered models by building this ship. An unusual feature which we present here is that this ship may be flown indoors or outdoors, or may be constructed with single surface or double surface wings. The structure of the wing has been designed specifically for either case.

Motor Stick

We advise you to start your construction with the simplest part; that is, the motor stick. This is made from a piece of medium hard balsa 3/16" square and 18" long. At the rear it is bevelled down on the *underside* to a thickness of 1/16". The bevel should start three inches in front of the rear end of the stick. Sand the stick down lightly to make the surfaces smooth.

Landing Gear

Now form the landing gear out of a piece of 1/32" or .032 wire. The measurements of the landing gear are shown on the drawing. Make the bends carefully and be sure that it is shaped properly.

Next make the wheels. These are one inch in diameter and are made from hard balsa. The tread is sanded to one-half round. Drill a small pinhole through the center and cement a washer on each side of the wheel so that the hole in each washer is directly centered over the axle hole in the wheel. When the wheels are finished, place them on the axle ends, bending up the end of each axle which protrudes from each wheel so that the wheels are held in place.

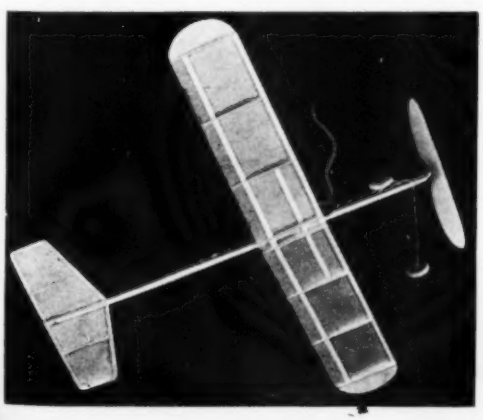
The bearing for the propeller is of the type shown in the drawing. These can be purchased at any model supply house. Now force the front end of the motor stick into the "U" loop of the landing gear. Be sure that the bevelled rear end of the motor stick is facing *down*. Smear the front end of the stick with cement and place the propeller bearing on the top of the stick and wind thread around, as shown in the drawing, to hold the parts in place. A small piece of balsa is cemented to the lower rear side of the motor stick to act as a tail skid, (see drawing).

Tail Surfaces

Now you can make the tail surfaces. These are made of strips of medium light balsa. The sizes of the strips are indicated on the drawing. Cut them to the proper length and cement them together on a flat surface. In the lower corners of the rudder, cement two bevelled braces (see drawing). You are now ready to cover them with paper.

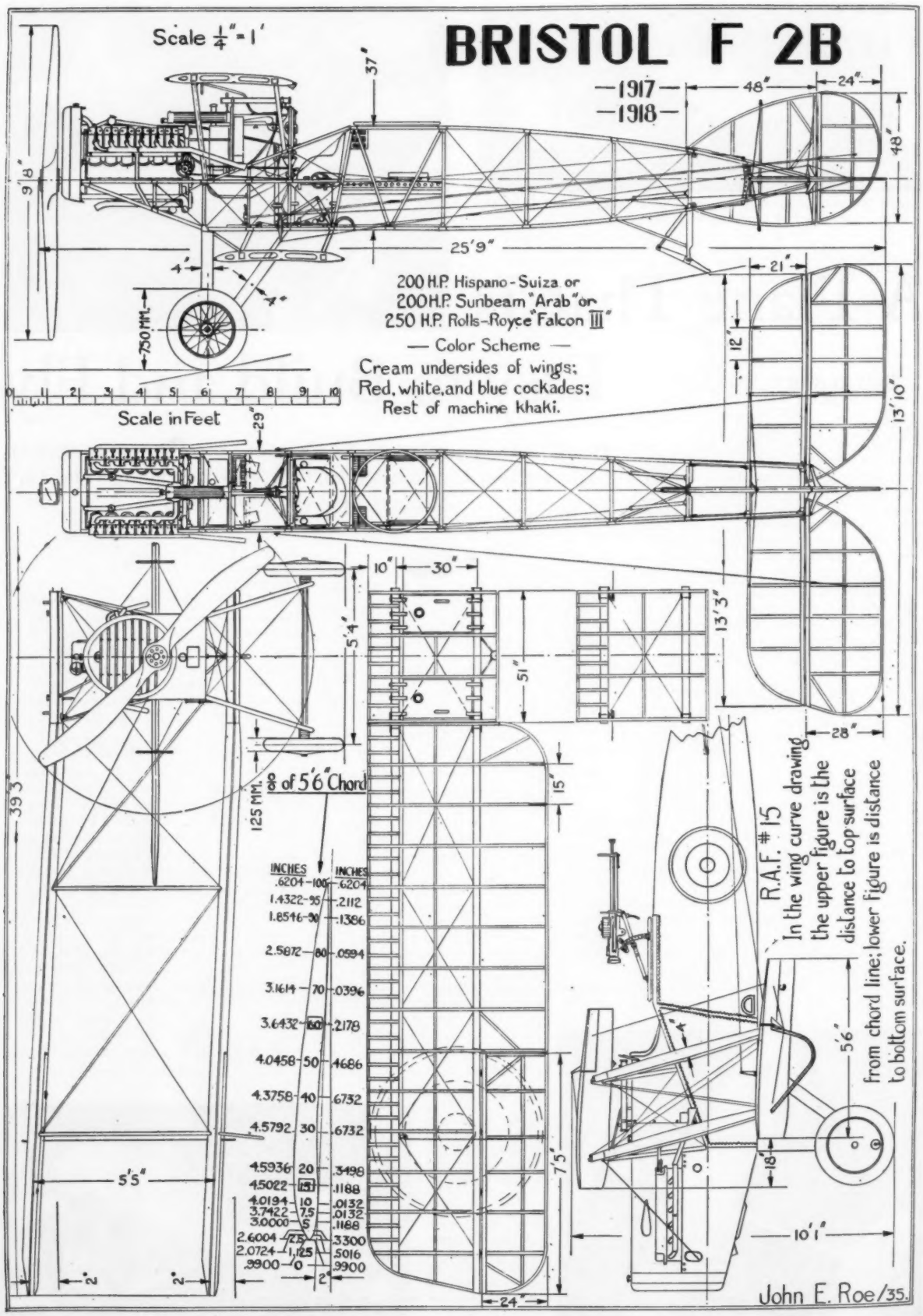
Those of you who have never done this operation before should follow these instructions closely. Cut a piece of paper, Jap white tissue, so that it is slightly larger than the stabilizer. Now smear the center and middle ribs with banana oil. Place the paper directly over the stabilizer so that it covers it entirely. Press the paper down with the fingers to the center rib; then,

(Continued on page 34)



Left. Here you can see the wing construction with single surface covering

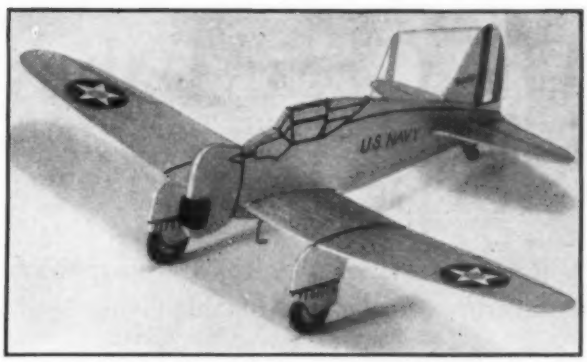
A double surface wing is easily made by covering the underside of the wing


BRISTOL F 2B
Scale ¼"=1'
—1917—
—1918—
48"
24"
37"
9'8"
25'9"
4'
4'
750 MM.
200 H.P. Hispano-Suiza or
200 H.P. Sunbeam "Arab" or
250 H.P. Rolls-Royce "Falcon III"
— Color Scheme —
Cream undersides of wings;
Red, white, and blue cockades;
Rest of machine khaki.
Scale in Feet
29"
21"
12"
13'10"
13'3"
10"
30"
5'4"
51"
28"
39'3"
125 MM.
⅝ of 5'6" Chord
15"
INCHES
INCHES
.6204 — 100 — .6204
1.4322 — 95 — .2112
1.8546 — 90 — .1386
2.5872 — 80 — .0594
3.1614 — 70 — .0396
3.6432 — 60 — .2178
4.0458 — 50 — .4686
4.3758 — 40 — .6732
4.5792 — 30 — .6732
4.5936 — 20 — .3498
4.5022 — 15 — .1188
4.0194 — 10 — .0132
3.7422 — 7.5 — .0132
3.0000 — 5 — .1188
2.6004 — 2.5 — .3300
2.0724 — 1.25 — .5016
.3900 — 0 — .3900
2"
2"
2"
5'5"
24"
7'5"
R.A.F. #15
In the wing curve drawing
the upper figure is the
distance to top surface
from chord line; lower figure is distance
to bottom surface.
5'6"
18"
10'1"
John E. Roe/35.

Something New for Beginner or Expert

How You Can Make a Scale Flying Glider of the Latest Northrop Fighter—Another Plane for Your Airport

By JESSE DAVIDSON



The finished model, realistic in appearance, a fine flyer, yet so simple that the beginner can build it

PROBABLY you have built a glider at one time or another that would fly very gracefully, performing various maneuvers that sent thrills down to the ends of your nerves. However, did your little plane actually resemble a real "honest-to-goodness" airplane? Here is one that does; one that is so simple to make that you can build it from scraps of sheet balsa in less than an hour. A little lacquer and a few decorations applied to it make it strikingly like its real big brother, the U. S. Navy's latest fighter.

It is designed to a scale of three-sixteenths of an inch to the foot, the same scale to which the model Lockheed glider was built, that appeared in the May issue of MODEL AIRPLANE NEWS. Thus, you will have another scale model of the correct size for your miniature airport after you have completed its construction.

All parts shown in the plan are indicated by letters and are listed below with the respective dimensions of the wood from which they should be cut:

A wing, 1/32"x1 1/16"x5 1/2"
B fuselage (side and top views, 3 5/8"x7/8"x1/16"
C elevator, 1/32"x1 3/32"-x2 1/8"
D rudder, 1/32"x1"x7/8"
E radio mast, 1/32"x-3/32"x1/2"
F landing gear (side and front views), 1/32"x5/8"-x3/4"
G tail skid, 1/32"x3/16"-x1/4"
H wire launching hook
J Position for nose weight
K propeller, 1/8"x3/16"-x1 9/16"
L. E. leading edge
Q fillet strip

Instructions

The patterns of the wing, side view of fuselage, rudder, elevator, and wheel pants are the main parts of the model and are shown in black. They may be cut out and their outlines traced on balsa sheet, or if you do not wish to cut your magazine, tracing paper may be used to transfer the outlines of these patterns on to the wood.

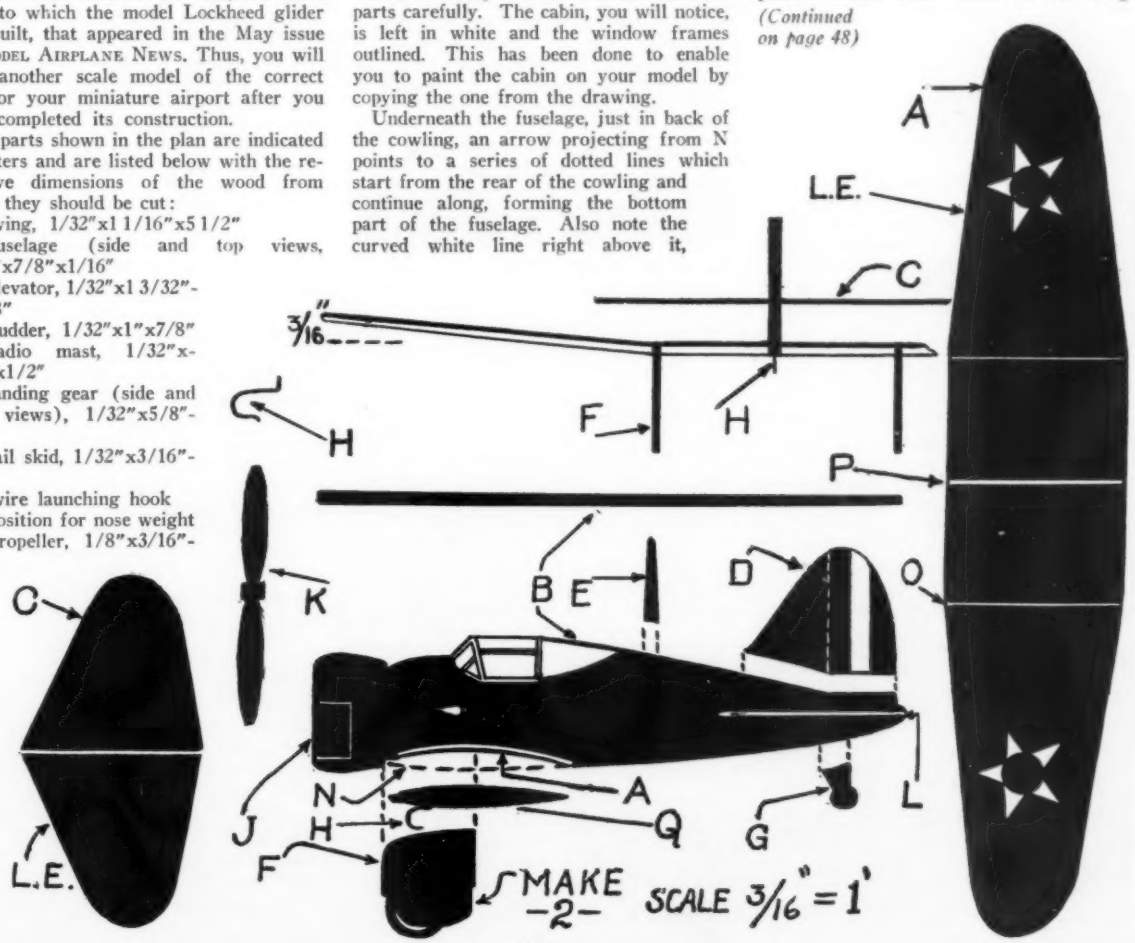
The first step is to cut out all the main parts carefully. The cabin, you will notice, is left in white and the window frames outlined. This has been done to enable you to paint the cabin on your model by copying the one from the drawing.

Underneath the fuselage, just in back of the cowling, an arrow projecting from N points to a series of dotted lines which start from the rear of the cowling and continue along, forming the bottom part of the fuselage. Also note the curved white line right above it, shown by A. That is where the wing is to be placed. After the wing is cemented in place, a piece of wood of the same thickness of the fuselage is cut to the shape of the "fillet strip," shown by Q, and cemented flush underneath the wing thus forming and completing the underpart of the body. To this "fillet" is cemented the wire launching hook, H, in the position shown in the drawing.

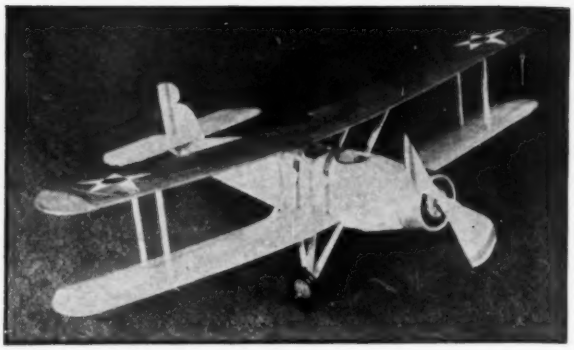
The wing, before placing it in the position just described, must be cambered and a dihedral angle set in the wings.

The white line shown by P on the wing pattern is the exact center of the wing.

(Continued on page 48)



Build and Fly The Great Lakes Torpedo Plane



Plenty of wing area gives it a steady climb

Plans and Instructions Which Will Enable You to Construct a Realistic and Stable Flying Model of a U.S. Navy Torpedo Carrier

By WILLIAM WINTER and WALTER McBRIDE

THE torpedo plane is one of the late developments of modern warfare and a strong inducement for peace. Planes of this type carry a huge torpedo slung beneath the fuselage which is started on a deadly voyage toward an enemy war ship by being released close to the surface of the water. The plane then speeds away, provided it is not shot down before it can make its escape.

The Great Lakes Torpedo plane is one of the famous types used in the U.S. Navy. It has been standard equipment on the aircraft carriers for some time. This plane is a single-engined, three-place ship whose rugged lines conceal its adaptability to a wide variety of flying and fighting conditions. The limited space aboard ship makes it necessary to combine the performance of a torpedo plane with that of a high altitude bomber. The development of anti-aircraft necessitates the ability to climb to high altitudes in order to insure surprise attack.

The model presented to you here is a faithful reproduction of the real ship and a stable flyer. The ship is all silver with the exception of the top surface of the upper wing, which is painted yellow. Navy stripes are painted on the rudder. When finished neatly, the ship is very realistic in appearance and performance.

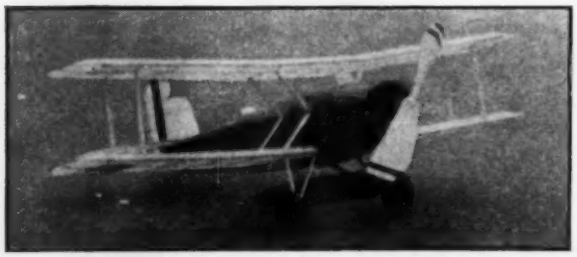
Fuselage

Both fuselage sides are built at once. The longerons of 3/32" square are held in place on the drawing by pins. All crosspieces are cut to size and cemented in place. When dry, remove pins and separate fuselage halves with a razor blade. Cut all crosspieces shown on the top view to their correct length. Cement the fuselage together at the widest points, as seen on the top view. Use pins to hold work in position. Draw rear of fuselage together and glue. Attach the rudder post. The front shape of the fuselage is attained by cracking the longerons at the second crosspiece as is noticeable on the plan. Nose block A is cut as shown in detail from a piece of soft balsa 2" sq. x ½" and fastened to the fuselage. All formers of 1/32" sheet are cut to proper shapes and cemented in position. The stringers of $\frac{1}{16}$" square are located in the proper notches and glued. The cockpits are formed by bending 1/32" sheet. They are cut to the proper outline and sanded smooth after the cement has set. The rear hook assembly is detailed on the plan.

The model in full flight gives anyone a thrill because of its realistic appearance

To cover, use individual pieces of Jap tissue for each side and the flat portion of the bottom of the fuselage. Narrow strips of tissue are used to cover the curved sections. The covering is applied with clear dope. The completed covering is sprayed and doped.

The $\frac{1}{16}$" square bamboo tail skid and the torpedo hooks are now attached to the fuselage. The windshields are cut from celluloid and folded to shape. The edges of the cockpits are trimmed with black dope.



The model with torpedo attached, ready for action

Lower Wing Stubs and Landing Gear

The ribs for the entire plane are cut from 1/32" sheet, pinned together and sanded to the proper outline. Cut the notches for the spars and the leading edges. Pin the stub spars of $\frac{1}{16}$" x ⅛" to the bench and cement the ribs in position. Attach the leading edge (3/32" square) and the trailing edge of $\frac{1}{16}$" x $\frac{3}{16}$" to the wing stubs. Small pieces of $\frac{1}{16}$" square are inserted between the ribs to prevent their warping when the covering is applied.

Cover each side of each stub with a separate piece of tissue and dope. Attach the stubs to the fuselage at the proper position and incidence. A small piece of wire or bamboo is passed through the fuselage flush with the leading edges of the wing stubs and is cemented to them. This will prevent the damage that usually results when the wings strike some obstacle. The lower center section struts of $\frac{1}{16}$" x $\frac{3}{16}$" are cut to their correct sizes and attached. The landing gear struts of $\frac{1}{16}$" x $\frac{3}{16}$" are cut to size and glued in position. If your workmanship tends towards a heavier plane, it is advisable to use ⅛" x ¼" for these struts. Mount the wheels on a piece of .028 wire, bend the axles to shape and attach to landing gear. Bind with thread and cement.

Tail Surfaces

Pin the spars of $\frac{1}{16}$" x 3/32" to the plan and locate the cross pieces. The stabilizer leading edge of 3/32" square is cemented in place. The trailing edge is of $\frac{1}{16}$" square bamboo. The curved tips are of $\frac{1}{16}$" sheet matched as designated to eliminate warping. The edges of the rudder with the exception of the curved section of $\frac{1}{16}$" sheet are of $\frac{1}{16}$" square bamboo.

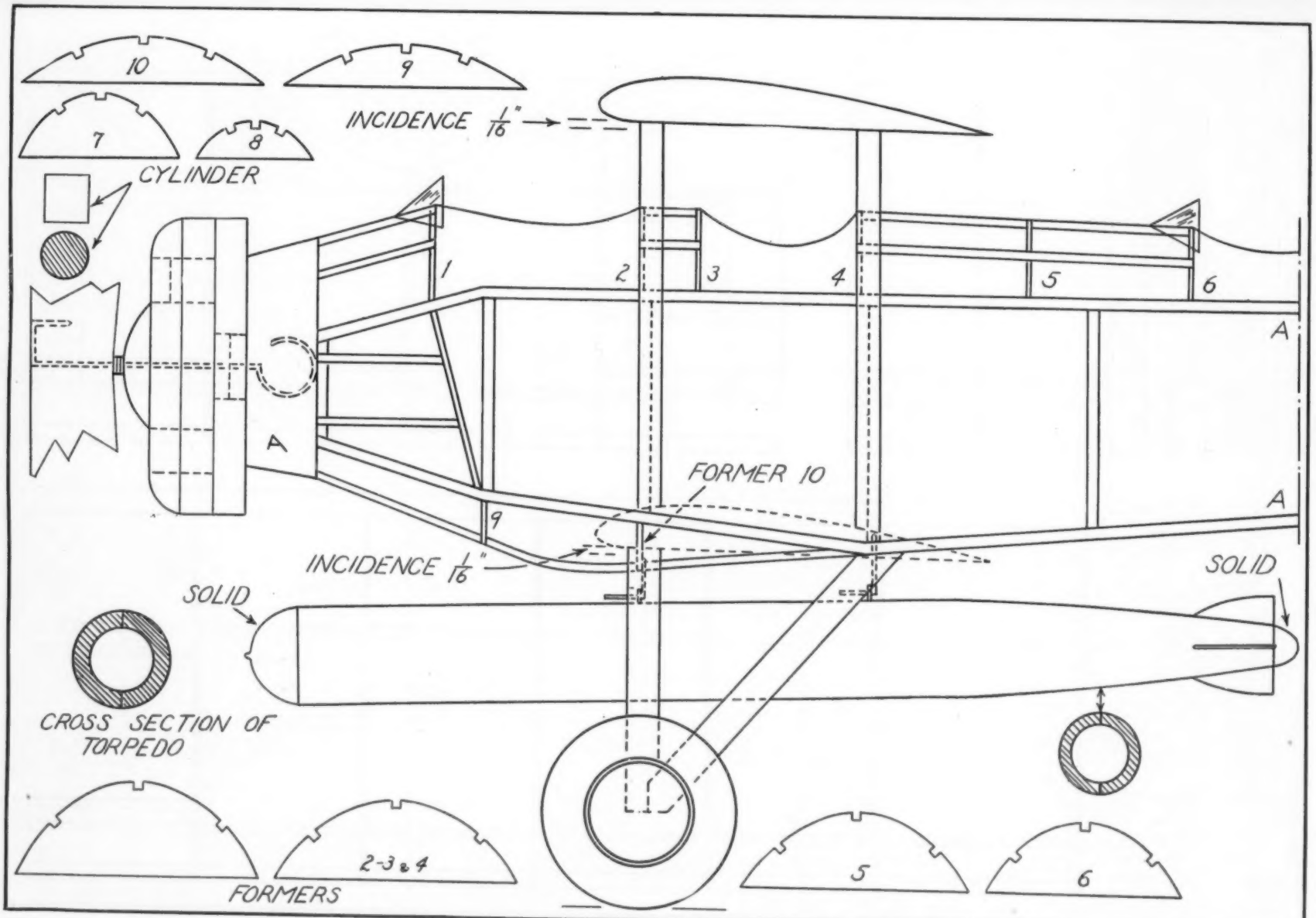
To cover use separate pieces of tissue for each side of both stabilizer and rudder. It is not advisable to spray the tail surfaces as warping may result. Navy stripes are painted on the rudder. Attach the completed tail assembly to the fuselage. The stabilizer braces are given on the plan and are cut from $\frac{1}{16}$" x ⅛".

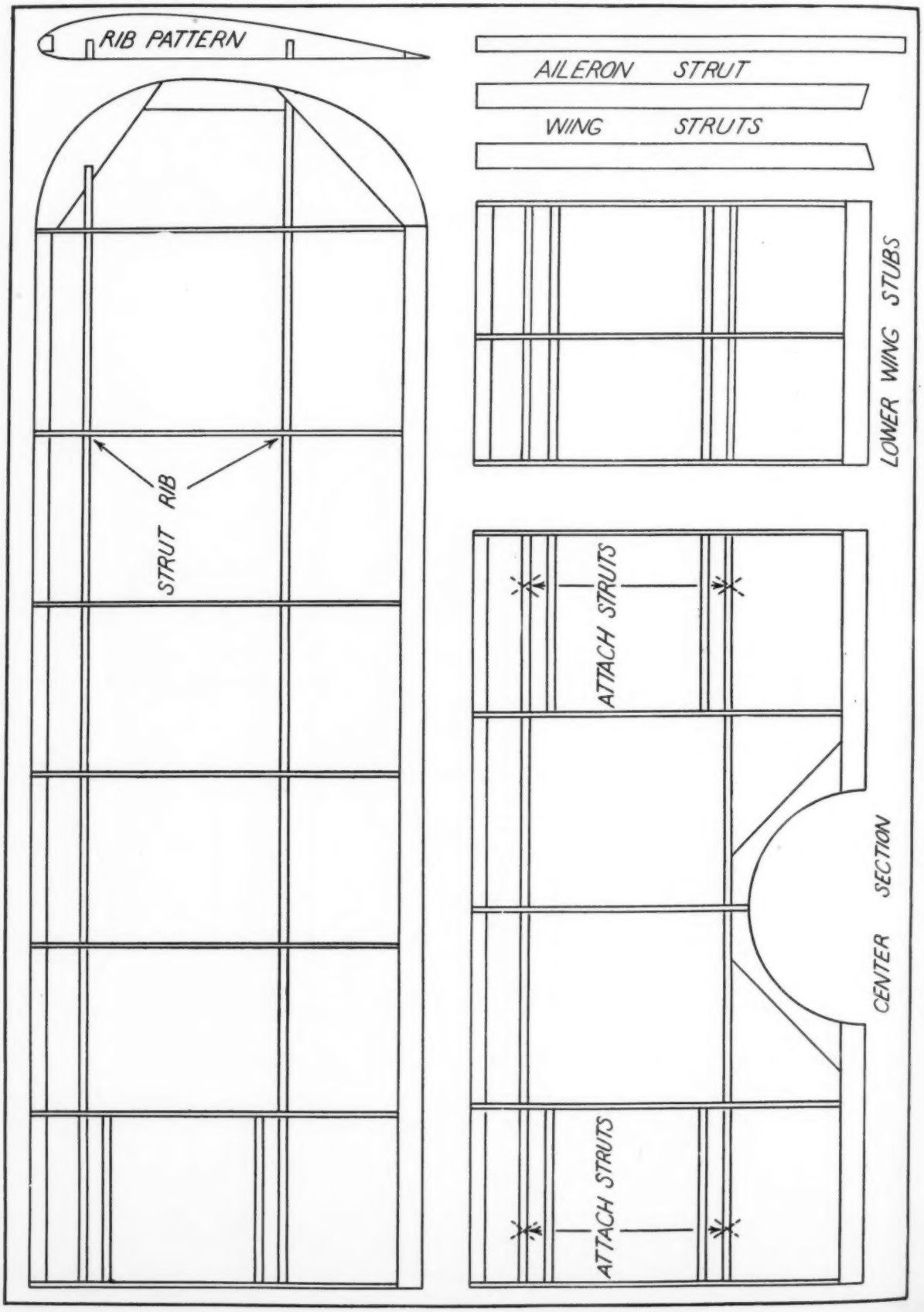
Center Section

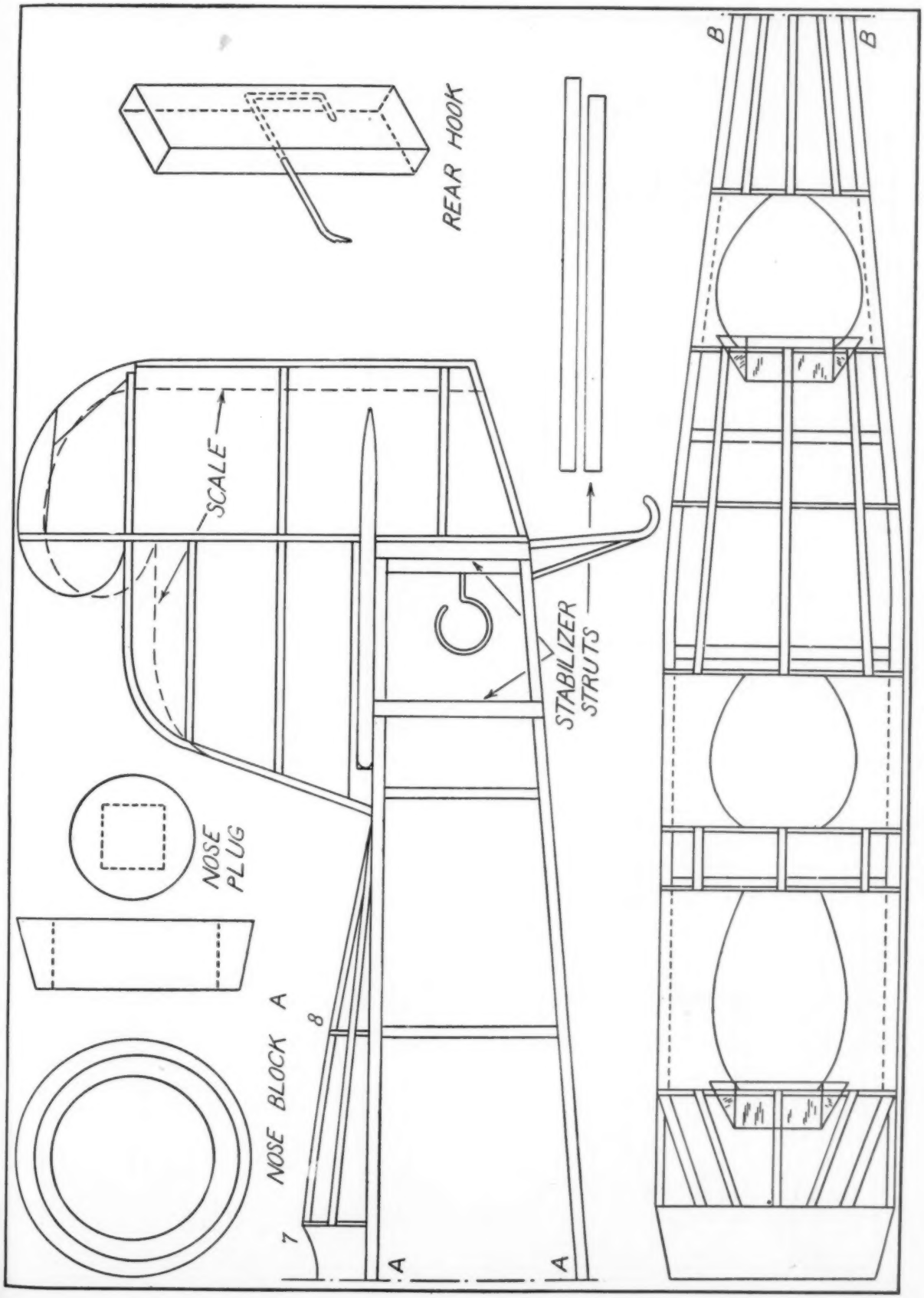
(The upper wing may be built in one piece if it is so desired.)

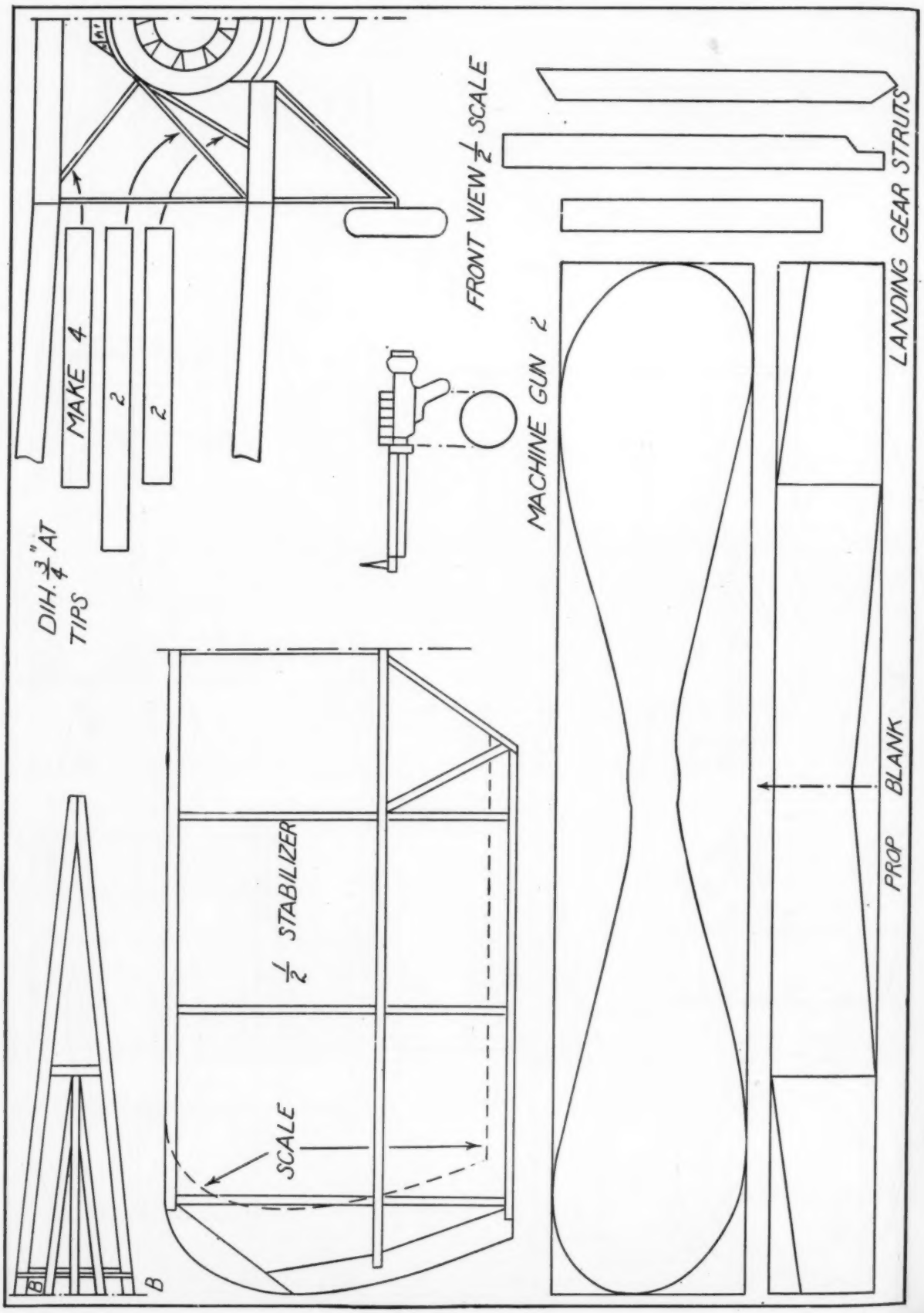
Pin the spars of $\frac{1}{16}$" x ⅛" in place on the drawing and cement the ribs in position. Glue both the leading edge of 3/32" square and the trailing edge of $\frac{1}{16}$" x $\frac{3}{16}$" in place. The cut-out is formed by cutting $\frac{1}{16}$" sheet to shape as is seen on the plan. Insert small pieces of $\frac{1}{16}$" square between the two outer ribs.

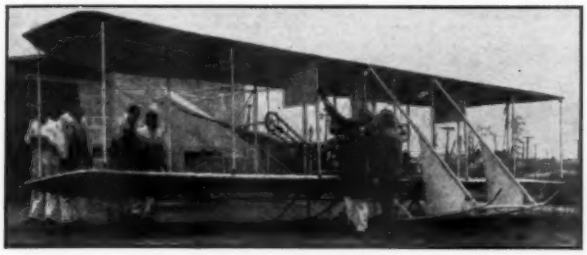
(Continued on page 39)


10
9
7
8
CYLINDER
INCIDENCE 1/16"
1
2
3
4
5
6
A
A
A
FORMER 10
9
INCIDENCE 1/16"
SOLID
SOLID
CROSS SECTION OF TORPEDO
2-3 & 4
FORMERS
5
6


RIB PATTERN
AILERON STRUT
WING STRUTS
LOWER WING STUBS
STRUT RIB
ATTACH STRUTS
CENTER SECTION
ATTACH STRUTS


REAR HOOK
B
B
SCALE
STABILIZER STRUTS
NOSE PLUG
NOSE BLOCK A
8
7
A
A


MAKE 4
2
2
DIH. 3/4" AT TIPS
FRONT VIEW 1/2 SCALE
MACHINE GUN 2
LANDING GEAR STRUTS
PROP BLANK
1/2 STABILIZER
SCALE
B
B



Picture number ONE

Picture number TWO

Airplane Observers Contest—No. 2

$50.00 in Cash Awards Will Be Given to Readers Who Name These Planes Correctly

HOW well do you know your airplanes? Here is your chance to show how expert you are in spotting the various makes and types of ships. You will not only find it a fascinating pastime to name these ships, but highly instructive. Many of our aviation experts have started their careers by participating in some minor activity of a similar nature. Here is YOUR chance. Why not start now? It is easy! This is all you have to do:

In the box in the center column you will see the names of four of the airplanes pictured on this page. Write these four names after the *correct picture number on the coupon at the bottom of the page.* Put the name corresponding to picture No. 1 on line No. 1; the name for picture No. 2 on line No. 2, etc. There will be two pictures left without names after you have placed the four names after four picture numbers.

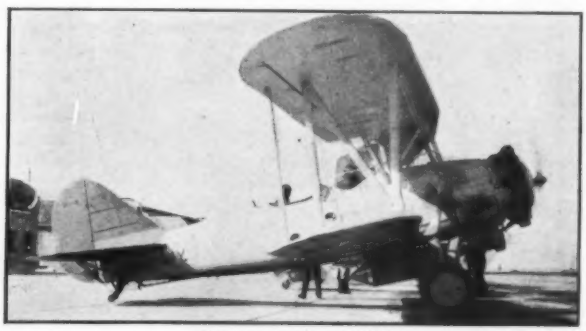
Grumman SF-1
Early Wright (1913)
Curtiss O-40-B
Martin BM-2

Write the correct names of the remaining airplanes after their numbers on the coupon. When you name the unknown planes be sure you give the complete name and model numbers, if there are any numbers. Only entries with complete names given will be eligible for the awards. For instance, merely, "Curtiss Hawk," is not correct. The correct form is, "Curtiss Hawk P6-E."

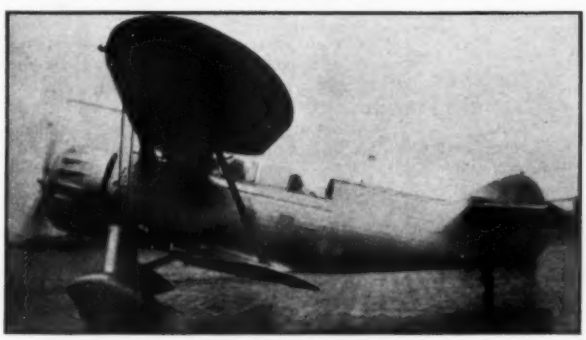
Finally print your name and address clearly on the coupon in the spaces allowed. Neatness and simplicity count. Cut or tear

(Continued on page 39)

Picture number THREE



Picture number FOUR



Picture number FIVE

Picture number SIX

No. 1..... No. 4.....

No. 2..... No. 5.....

No. 3..... No. 6.....

Name ..... Address .....
(Print Plainly)

AIR WAYS
HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

The Bellanca Bomber, by Dick Anderson

FLOWERS are not the only form of life that are coming forth from their winter sleep. There seems to be an extreme rustle and bustle among the model builders. Each passing day sees greater activity. Most of them now are looking forward to the Eastern States Contest to be held at Hadley Field, New Brunswick, N.J., on May 25, and to the "Nationals" to be held at St. Louis, Mo., on June 27, 28, and 29. The season promises to bring forth many new ideas and great improvements in model plane design, especially in gas engine models. A great number of model builders continue their activities throughout the winter season preparing for the good weather through the spring and summer months. We have some interesting pictures this month sent in by such model builders. They help to show the extent and nature of their activities.

Here is a new aeronautical artist, Dick Anderson of 122 Emery Street, Portland, Maine. He has favored us this month with a drawing of the new Bellanca Bomber, which appears as our heading.

One of the country's foremost scale model builders, Louis Casale of 228 Sherwood Avenue, Syracuse, N.Y., is awarded the place of honor for a picture of the finest plane. Picture No. 1 shows his ship, a Waco Taper Wing with which he won the Scale Model Event at the 1934 "Nationals," held at Akron last June. This ship is one of the most completely detailed models ever built. Among the features are an adjustable pitch propeller, Wright J-6 motor entirely built up and turned out of brass, gas and oil tanks containing real gas and oil, carburetor and magnetos controlled from the cockpit, demountable cowling pieces, shock absorbers, brakes that work from the cockpits and all movable controls including stabilizer and lighted cockpit instrument board. The little ship is entirely built up of metal except the wings and is assembled with jeweler screws. It can be dismantled in exactly the same fashion as the real ship. This is a picture of one of the most complete and detailed airplanes that we have had the pleasure of publishing.

Though gas model airplanes are complicated and difficult to construct, model fans have made great progress in this line. Here is an unusual one built by Edwin Daniel Calkin of 3055 Northeast Everett Street, Portland, Maine. It is only thirty-six inches in wing span; one of the smallest ships that has yet been built. It is powered with an Elf engine and weighs complete, thirteen ounces. The engine weighs four ounces. It is shown in picture No. 2.

Trick photography appears to be quite the rage among certain model builders. Picture No. 3 is a fine example of how easily one can be fooled by a photograph. It is a picture taken by Jerome Hoffer, Jr., of 203 Lourens Street, Camden, S.C., of his model Monocoupe. Though it has a span of only twenty-three and a half inches,

Pict. No. 1. A super detail scale Waco "Taper Wing," winner at the 1934 Nationals for Louis Casale

Pict. No. 2. A 36" span gas job with a very small gas motor, built by Edwin Calkin

Pict. No. 4. A model Polish Fighter built by Reid Patterson from plans in *Model Airplane News*

Pict. No. 7. An unusual fuselage type model in full flight, built by Roland Langarzo

Pict. No. 8. James Mandigo with his six-foot compressed air model

Pict. No. 14. A member of the Ace Aero Association gliding in to a landing

Pict. No. 3. A 23½" model Monocoupe that looks like a large plane; posed and built by Jerome Hoffer

Pict. No. 5. A complete detailed model airport built by Alfred Bacon. There are even "model students" in the planes

it appears as a full-size ship, capable of carrying the man who is standing directly behind it. The picture was taken by placing the model close to the camera and the camera close to the ground. In the background is a real hangar at one of the airports.

Reid Patterson of 325 East Seventh Street, Charlotte, N.C., writes and tells us that he was looking through some of his old copies of MODEL AIRPLANE NEWS and came upon the plans of the Polish Fighter. He liked them so well that he built a model from them, which is shown completed in picture No. 4. It is a nice-looking job indeed, and incidentally is a fine flier.

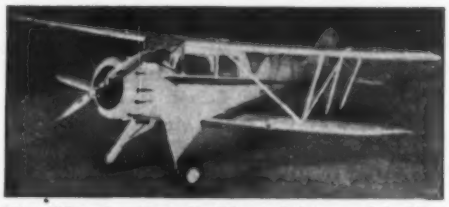
In past issues of the magazine, we have disclosed the art of model airport building to a certain extent. However, the prize picture in this field is picture No. 5, which shows a model airport complete in every detail, built by Alfred Bacon of 519 Penn Street, Chester, Pa. In order to discover many of the interesting details shown in this picture it would require considerable time and study. The more one looks at it, the more one can see. You will note the small automobiles to scale, the people, the floodlights, judges' stand, wire fence as well as the model planes on the field and the model ships in the background. On the runway, a miniature Gee Bee is just taking off. We have to hand the proverbial "blue ribbon" to Alfred Bacon for this one.

Another excellent job which has come to us this month is shown in picture No. 6. It is a Waco Cabin plane built by Jack Dettis of 54 Bellanca Avenue, Pittsburgh, Pa. It is unusually fine with careful attention having been paid to details. The interesting part of this ship is that the fillets have been made from a mixture of laundry starch and clear dope. How to use this is explained in Slipstreams on page 24 of this issue. In making this suggestion as to fillet construction, Dettis has contributed a fine idea.

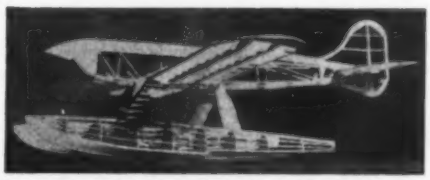
One of the most original and unusual flying models of the year is shown in picture No. 7. It was built by Roland Langarzo of 33 Sunset Avenue, Lynbrook, N.Y. The model is in full flight. It has a wing span of twenty-four inches. Note the unusual fin which extends all the way from the trailing edge of the wing to the rear of the fuselage. The model is extremely stable.

There is a young man out in Kansas City, Mo., who has just finished an aeronautical engineering course at Kansas University, and is gaining plenty of practical experience by building large flying models. He is James A. Mandigo of 4422 Millcreek Parkway, Kansas City, Mo., who is shown in picture No. 8 with his six-foot span, compressed air job. The ship is beautifully made, as can be seen from the picture. This machine is unusual inasmuch as it is

(Continued on page 45)



Pict. No. 6. A scale Waco Cabin model that shows fine workmanship by Jack Dettis



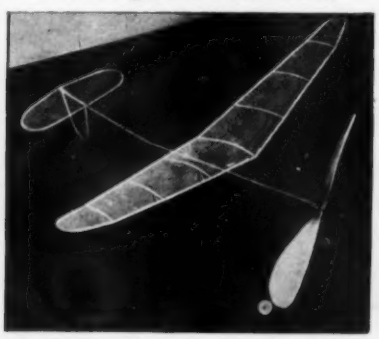
Pict. No. 12. A model Macchi-Castoldi constructed by a French model builder

Pict. No. 16. The latest Wedell-Williams. Photo by W. Beerman of the A.A.P.E.

Pict. No. 13. Model fliers preparing for a flight at a French contest

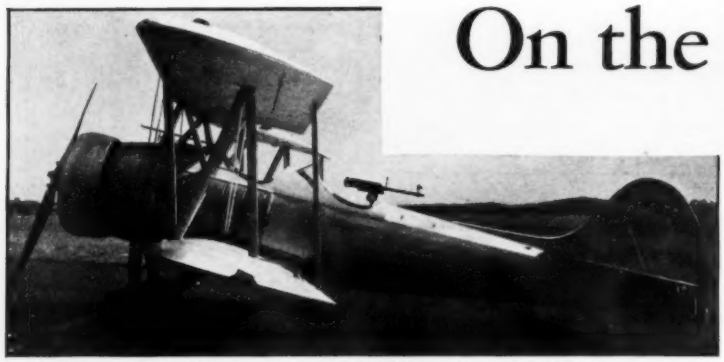
Pict. No. 10. Australian model fliers going into action at a recent contest near Sydney

Pict. No. 11. We read *Model Airplane News!*



Pict. No. 9. An unsually fine shot of a microfilm job built by Ted Booth

Pict. No. 15. Winners of the Tenk Hardware Company Contest held recently at Quincy, Ill.



The new Vought Corsair Jr. light military plane. Speed 155 m.p.h.

On the Frontiers of Aviation

High Lights of New Developments in Military, Racing and Commercial Airplanes—How to Make a Scale Model of the Uppercu-Burnelli UB-14

By ROBERT C. MORRISON

CROSSING the continent in 11½ hours is quickly becoming an habitual occurrence. The Northrops and Vultees have been competing vigorously for record flights from coast-to-coast. The flights of Jack Frye in a Northrop and Jimmie Doolittle in a Vultee are well known, but in the past two months there have been even faster flights that have gone almost unnoticed by the press. Leland S. Andrews, flying a Cyclone-powered Vultee, made the trip in 11 hours and 34 minutes on February 21st. The famous Russell Thaw also flew across the continent in a new Northrop Gamma. His flying time was 11 hours and 20 minutes. The flight was just short of breaking the record for mail planes held by Jack Frye, but Andrews' flight is the fastest ever made from coast-to-coast for passenger planes.

The ship that Russell Thaw flew has been recently purchased by the Guggenheims. It is a two-place low-wing sport plane similar to other Northrops. (See "Model Airplane News" April issue, page 16.) His average speed was 223 m.p.h.

William Randolph Hearst, Jr., has purchased a new Vultee transport with a very luxurious interior. He will use it for his newspaper work throughout the country.

The Uppercu-Burnelli Corporation is now actively engaged in building some new military planes with hopes of getting one of the many large Army Air Corps orders. No details of the planes are available at present, but information has now come to light on Clyde Pangborn's ship. The Burnelli Company writes us that his ship, in which he expects to make a non-stop flight around the world, is very similar to the Uppercu-Burnelli UB-14 that was completed several months ago. Plans of Pangborn's ship are included in this article. The only variation in the transport and the Pangborn ship is that the latter has extra long-range gas tanks and apparatus for refueling when the ship is in the air.

The second Burnelli transport will soon be completed. The first ship cracked up unfortunately, though not from any fault in its design, and it is now being rebuilt. It will be completed some time this summer. The famous Lou Reichers was at the controls of the ship when the ailerons were wrenched off in a high-speed dive and brought it in to a rather abrupt landing, but saved his life and that of the other occupant in the plane.

Lou Reichers is without a doubt one of the better pilots in this country and he will probably pilot the second Burnelli UB-14 to new records on its completion this summer.

The cabin of the UB-14 is 12 feet wide and seats 14 people. The fuselage is of airfoil design and therefore has lifting power as the wing. The pilot cab enclosure slides rearward and offers excellent vision. Windows have been placed below and on each side of the two pilots for lateral downward vision.

The landing gear and wing flap are hydraulically controlled and an auxiliary manual control is supplied. The wheels may be retracted in 45 seconds and lowered in 12 seconds. The swiveling tail wheel is also retractable.

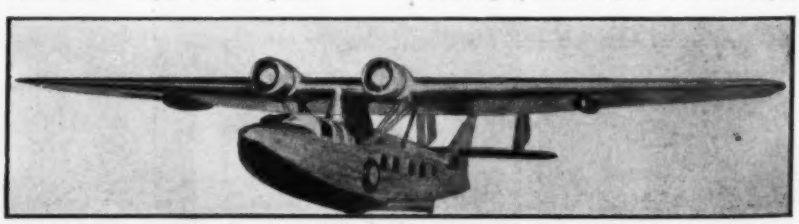
Following are the various instruments used on the plane, which is typical of all modern American super-transports today. Installed in the plane are a combination directional gyro and banking indicator, artificial horizon, compass, sensitive altimeter, drift indicator, rate of climb indicator, air speed indicator, outside temperature gauge, engine cylinder temperature gauge with multi-point selector switch, fuel pressure gauges, oil temperature gauges, oil pressure gauges, tachometers, clock, two hydrostatic fuel gauges, landing gear position indicator, dual engine primer, switches, manifold pressure gauges, ammeter, lights, controls and electrical units.

Before the large plane was built, a wind tunnel model of the ship was tested at the wind tunnel at New York University.

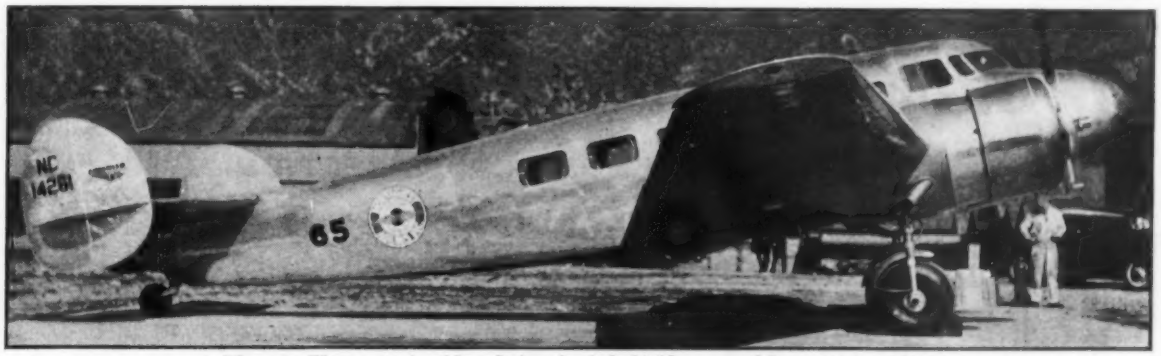
Performance data on the UB-14 follows:

Maximum speed at 10,000 ft.....225 m.p.h.
Cruising speed at 10,000 ft.....200 m.p.h.

The midget plane is an Allenbough A, with a 40 hp. "Salmson"



What the new Sikorsky S-43 will look like, powered with two "Hornets." It has retractable wing floats (Courtesy United Aircraft)



The new Electra 10 A with redesigned wind shield, powered by two Wasp Jrs.

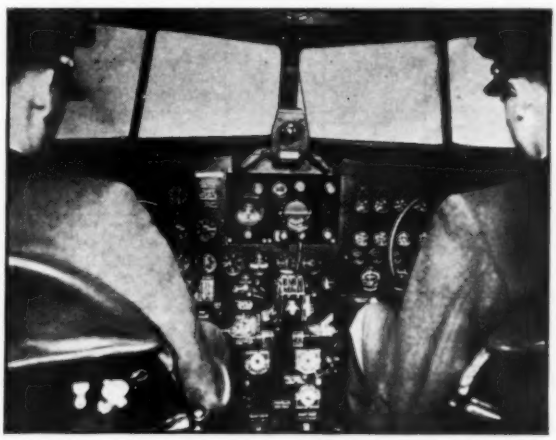
Maximum speed at 7,000 ft., one engine ..... 150 m.p.h.
Payload ..... 3,200 lb.
Service ceiling ..... 22,000 ft.

Johnny Allenbaugh of Los Angeles, California, has developed a small racer with a wingspread of only 14 ft. 4 in. A French 40 hp. Salmson 9ADC engine is the power plant and gives the ship a high speed of 140 m.p.h.

Bob McLarren of Los Angeles, writes us concerning the new Northrop Luxury Delta for the U. S. Coast Guard. He says, "This ship represents the very latest trend in beautiful lines, combined with one of the most luxurious interiors ever incorporated in an airplane. Deep, roomy seats of the richest plush are so arranged to accommodate six passengers in addition to a pilot and co-pilot. An extremely ingenious lavatory has been installed in the very smallest possible space. The pilot is equipped with every aeronautical and mechanical aid as yet introduced to aviation. These are compactly arranged before the pilot in neat rows of instruments. Northrop sound engineers have entirely sound-proofed the cabin so that the conversation is comparable to that within a Pullman car. The powful Cyclone engine pulls this speedy ship through the air at a speed of 230 m.p.h. This is the latest addition to the now extensive air force of the U. S. Coast Guard. This organization has purchased in the last six months, over $2,000,000 worth of aeronautical equipment.

The Sixth Annual National Soaring Contest will be held at Elmira, N. Y., on June 29-July 14. New glider designs will undoubtedly make their appearance there and the famous Bowlus-duPont sailplane, Albatros II, will also be on hand. The ship's performance is as follows:

Cruising speed ..... 32 m.p.h.
Stalling speed, without flaps..... 27 m.p.h.
Stalling speed, with flaps..... 23 m.p.h.
Gliding angle ..... 25 to 1
Can be airplane-towed up to..... 85 m.p.h.
Maximum dive with safety .....125 m.p.h.



Here is the new Sperry Gyro Pilot installed in a modern Douglas Transport (Courtesy Sperry Co.)

The Beech Aircraft Company has been testing a new Cyclone-powered Beechcraft. It should be one of the fastest planes of its type yet built.

Fairchild has been working on a new low-wing "45"! It will have a full cantilever wing with a retractable landing gear. The ship has a capacity for five passengers.

Waldo Waterman is producing a tailless sport plane for the Bureau of Air Commerce, and another new sport ship is the Shelton "Crusader." The plane is a 4-6 place low-wing cabin monoplane with two 125 hp. Menasco engines. The tail is on outriggers.

Another wonderful little sport plane is the Rearwin Speedster. The power plant may be either a 95 hp. American Cirrus or a 125 hp. Menasco. Its cruising speed is 120 m.p.h. with the Cirrus. The ship's landing gear and nose greatly resembles Art Chester's racer.

A new armored high-wing monoplane for the Navy has been tested in Santa Monica. The ship, known as the XO 30-1, is twin-engined. Boeing has out a new version of their P-26 pursuit and Vought a new version of the Corsair, known as the Corsair Junior. Both planes are for export.

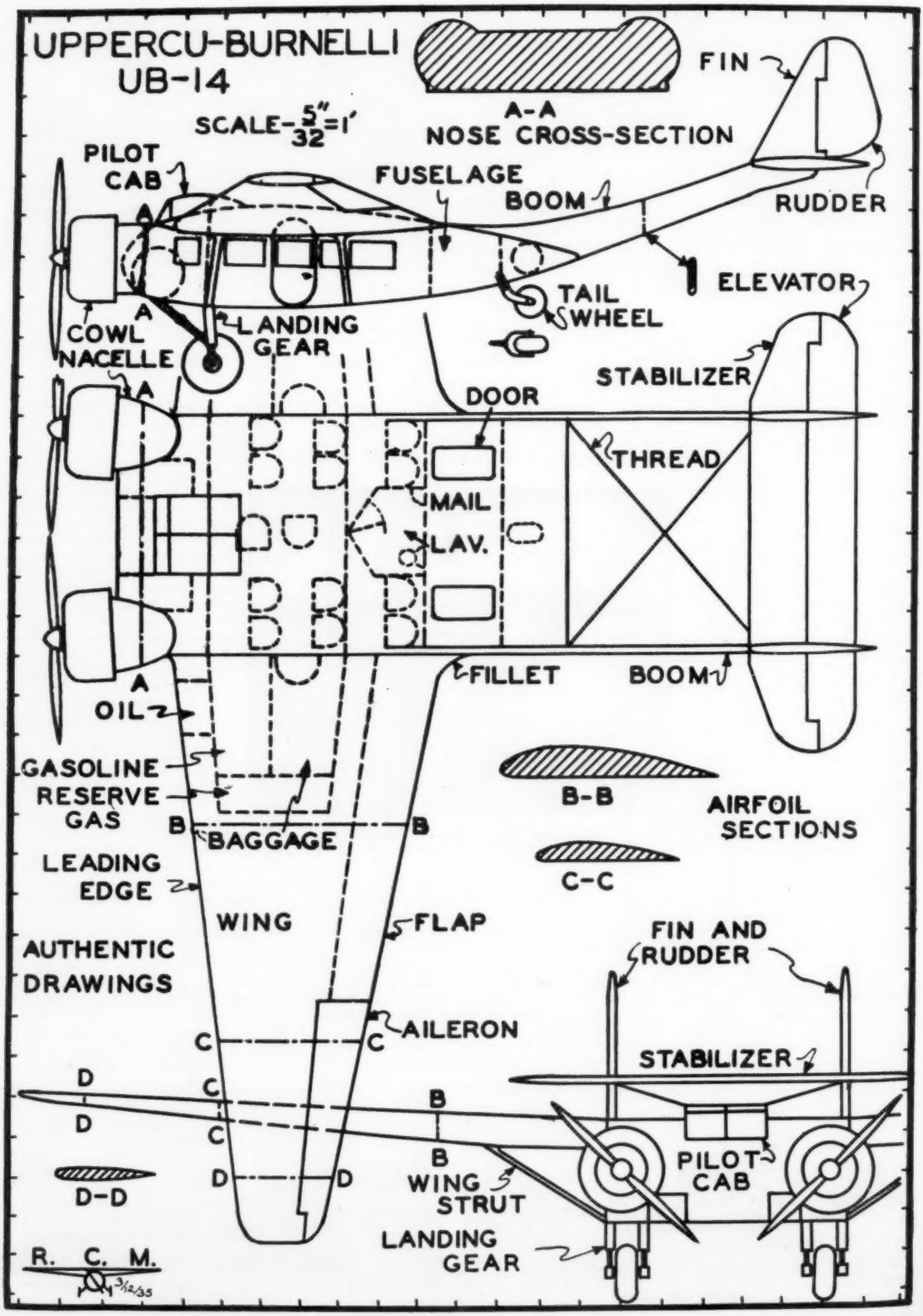
A new 2,000 horsepower engine is nearing completion! It is of the twelve cylinder, flat, opposed type. Though very powerful, the engine will be very small and compact. It will be able to fit inside the wing of any of our large transports. With such engines, planes with cruising speeds of 300 m.p.h. would become common! An anonymous automobile company is developing the engine and may first test it out on a racing car in an attempt to break the world's automobile speed record. Two engines are intended for use in the attempt. The engines are very light, making them easily adaptable for aeronautical use.

Two DeHavilland Comets, commercial versions of the racers, have been ordered by Air France. They will be used for carrying mail.

(Continued on page 38)

The Douglas U.S. Army flying boat YOA-2, with two 710 hp. Cyclones (McLarren)

The Northrop R.T-1, with a 735 hp. Cyclone, a late acquisition of the Coast Guard (McLarren)


UPPERCU-BURNELLI
UB-14
SCALE-5"/32=1'
A-A
NOSE CROSS-SECTION
FIN
PILOT CAB
FUSELAGE
BOOM
RUDDER
ELEVATOR
TAIL WHEEL
COWL NACELLE
LANDING GEAR
STABILIZER
DOOR
THREAD
MAIL
LAV.
OIL
FILLET
BOOM
GASOLINE
RESERVE GAS
BAGGAGE
B-B
AIRFOIL SECTIONS
C-C
LEADING EDGE
WING
FLAP
AUTHENTIC DRAWINGS
FIN AND RUDDER
AILERON
STABILIZER
PILOT CAB
WING STRUT
LANDING GEAR
D-D
R. C. M.
3/12/35

The Aerodynamic Design of the Model Plane

CHAPTER No. 4

ARTICLE No. 40

Formulae and Tables from Which You Can Determine Accurately the Amount and Rate of Energy Output of Rubber Motors

By CHARLES HAMPSON GRANT

IN THE preceding article, No. 39 of this series, formulae were given by means of which you could calculate the value of *Torque, Turns* and *Work* for *Brown* rubber motors of various numbers and sizes of strands, lubricated and stretched when wound. These formulae give values for these factors for motors of *any number* of strands. You will notice that the graphs give values only for two, four, six, eight, ten and in some cases twelve strands. Thus the formulae will provide the answers to many problems not embodied by the graphs.

These formulae, as in the case of the formulae for *lubricated, unstretched* motors, give correct answers for motors which have not been prewound. The values are for motors wound for the first time. To obtain the correct values for motors that have been wound several times, the values given by the formulae must be multiplied by a constant as in the case of other types of motors discussed in previous pages of these articles.

Stretching and *winding* lubricated motors causes the decrease in *torque*, the increase in *turns* and the change in the amount of work that it is possible to store, to become greater by about 50 percent. Therefore, the formulae for *lubricated* and *stretched brown rubber* motors should be multiplied by the following respective constants in order to obtain correct values for motors after they have been wound more than three times and more than six times, as indicated below.

The values given by all torque formulae should be multiplied by (0.83) after three windings and by (0.77) after six windings. The values derived from the formulae for the possible number of turns should be multiplied by (1.086) after three repeated windings of the motor and by (1.125) after six windings.

The values obtained for the work delivered decreases in value about the same percentage as unstretched motors and should be multipled by (0.94) for correct work values after three windings and by (0.92) after six windings.

Formulae for Lubricated and Stretched Black Rubber Motors

In order that you may determine the correct values of *torque, turns* and *work* for motors composed of *black rubber*, the following formulae are given. The values derived by means of the formulae are for motors *wound for the first time.*

Formulae for *maximum* torque are:

For 1/8″x1/30″ strands,

$$Q_{max} = 0.745(\sqrt{N^3} - 0.08N).$$

(Continued on page 42)

TURN TABLES FOR MOTORS

MAX. TURNS PER INCH OF MOTOR—BROWN RUBBER						
	1/8″x 1/30″ STRANDS			3/32″x 1/30″	1/16″x 1/30″	1/32″x 1/30″
STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D
2	38.3	59.85	91.74	104.	132.2	179.7
4	36.65	42.15	63.75	73.1	94.9	126.2
6	22.	34.17	50.9	59.1	74.15	102.2
8	19.33	29.4	43.	50.56	62.8	86.15
10	17.5	26.	37.3	44.68	54.88	80.3

MAX. TURNS PER INCH OF MOTOR—BLACK RUBBER						
	STRAND SIZE—1/16″ x 1/30″			STRAND SIZE—1/32″x 1/30″		
NO. OF STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D
2	67.25	77.2	125.	109.5	106.	170.3
4	43.7	55.3	89.7	68.7	75.13	121.8
6	35.	46.	71.35	54.25	61.5	100.7
8	30.	40.62	63.	46.3	53.2	88.8
10	26.64	37.16	56.46	41.05	47.75	80.7

BLACK RUBBER				
MAX TURNS PER INCH OF MOTOR				
	1/8″x 1/30″ STRANDS			3/32″x 1/30″
STRANDS	DRY	LUBRIC'T'D	LUBRIC'T'D STRETCH'D	LUBRIC'T'D STRETCH'D
2	40.4	58.3	86.7	100.
4	28.6	41.9	61.2	71.2
6	23.33	34.83	50.	58.7
8	20.16	30.9	43.3	51.4
10	18.08	28.32	38.75	46.6

Get Your Models Ready for the Eastern States Outdoor Contest

PROBABLY this will be the biggest contest held in the East this year. In fact, it is expected that it will rival the National Contest which will be held in St. Louis in the last part of June. So do not wait to make your models ready for this big event.

The events to be held are as follows:

1. Gas-powered Models. (Not over 7 lbs.)

2. Twin Pusher, Class C. (100 to 150 square inches)

3. Fuselage, Class D. (150 to 300 square inches)

4. Catapult Glider, Class C. (One pound pull.)

5. Free For All (Duration). Open to Any Type or Size of Rubber Driven Model. This feature has been added to stimulate development of new types of duration models. The winner may have a choice of receiving a large trophy or, a vacation of one week at Mr. Charles H. Grant's Model Airplane Camp, "West Wind Lodge," Peru, Vermont.

Very beautiful trophies or shields will be awarded to winners of the first three places of the other events.

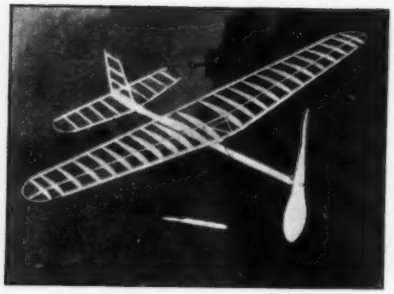
A special prize is offered for the best flight made by a gas engine powered Autogiro. There will be no limitations in this event.

Great pains have been taken to obtain the finest location for flying and worthwhile trophies. Both of these are assured.

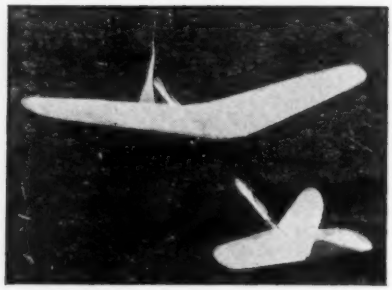
The Contest will be held on May 25th, starting at 9 a. m. at Hadley Field, located just five miles north of New Brunswick, New Jersey, and two miles south of Dunellen, New Jersey. You can reach the Field from either place by bus which runs on a regular schedule. To go to Dunellen, take the New Jersey Central Railroad.

Send in for your *Registration Blank* immediately. Address your request to Mr. Nathan Polk, Bamberger Aero Club, L. Bamberger & Company, Newark, N. J., or Charles H. Grant, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

Not stalling, but climbing steeply



The frame ready to cover



Finished, ready to give you thrills

A High-Thrust Experimental Model

How You Can Build an Unusually Fine Flying Model Embodying a New Feature That Prevents "Stalling"

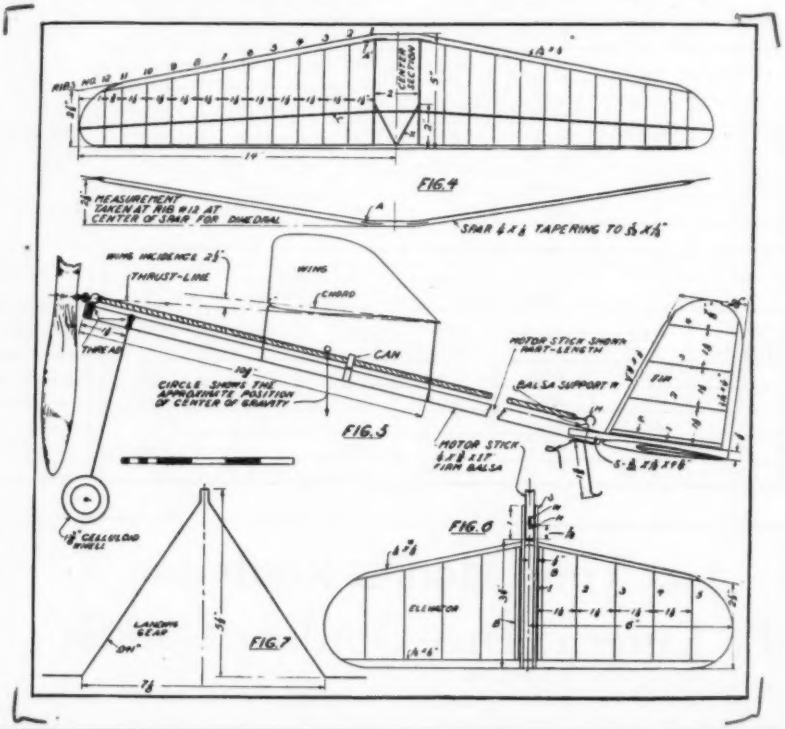
By R. T. DANIEL

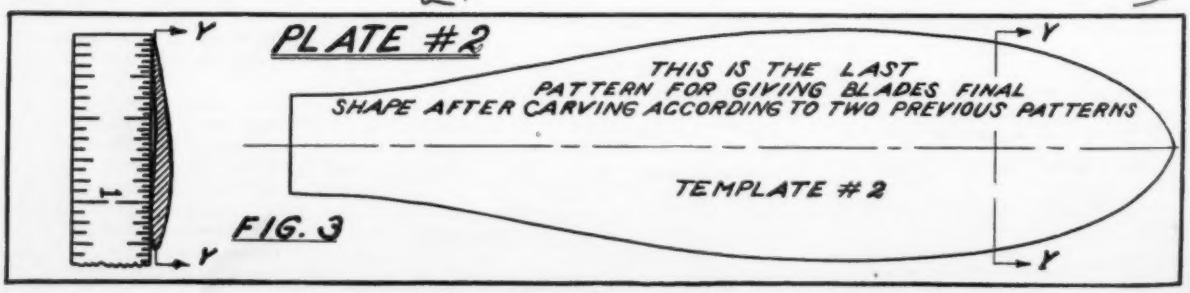
HERE we present a model which is unique in several ways. In fact it employs a new system of model airplane balance not heretofore used, but which was described by Mr. Grant in the series of articles entitled, "The Aerodynamic Design of the Model Plane." The principle was first tried on an indoor model. Its performance was indeed surprising and most pleasing. A model properly set up in accordance with this principle may be set for its best possible gliding angle and yet, with this same adjustment, be given power enough to climb very rapidly without any tendency to stall whatever. In other words, it's a sure cure for stalling when correctly used. This applies to "stick" or fuselage tractor models. Either for contest purposes or sure-fire flying, models with the usual set up of factors cannot touch this arrangement for performance.

New observers of this type of model usually remark, "Why, you have the wing on backward," or, "You have a negative incidence in your wing." However, neither condition is the case. (The wing incidence is always measured relative to the thrust line of the propeller.) It's a simple method of raising the line of thrust without disturbing the center of gravity and to adjust the angular setting of the wing and elevator accordingly. Readers desiring a detailed study of the underlying factors involved in the causes of stalling are referred to previous installments of "The Aerodynamic Design of the Model Plane" in this magazine.

The wing ribs are shown full size. Make four of No. 1 rib and two each of the rest, all from 1/32" light grade sheet balsa. The line through the nose of each rib shows where it is to be cut off to fit against the wing spar. Make the wing center sec-

(Continued on page 40)





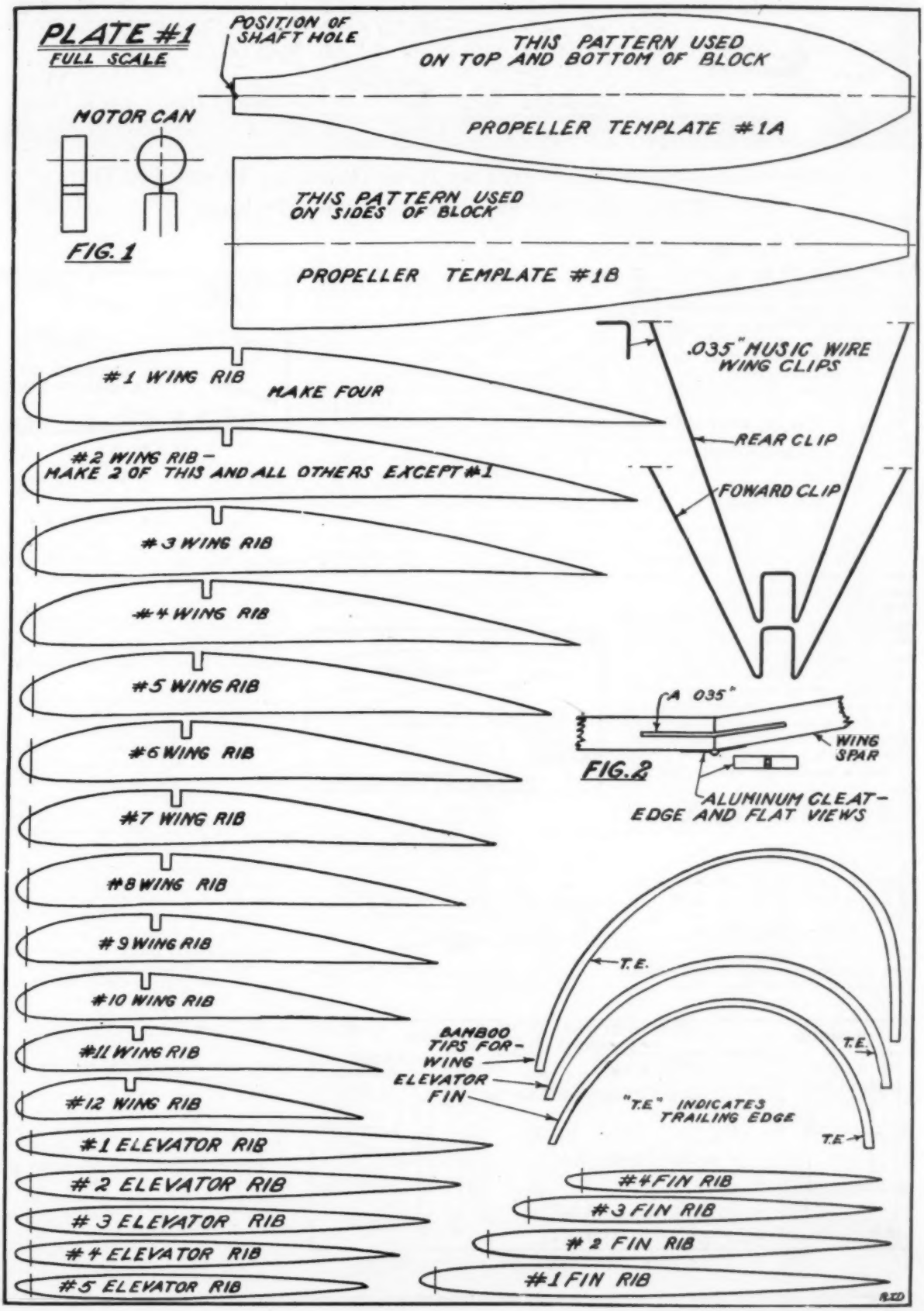


PLATE #1
FULL SCALE
POSITION OF SHAFT HOLE
THIS PATTERN USED ON TOP AND BOTTOM OF BLOCK
PROPELLER TEMPLATE #1A
MOTOR CAN
FIG. 1
THIS PATTERN USED ON SIDES OF BLOCK
PROPELLER TEMPLATE #1B
.035" MUSIC WIRE WING CLIPS
REAR CLIP
FOWARD CLIP
#1 WING RIB MAKE FOUR
#2 WING RIB - MAKE 2 OF THIS AND ALL OTHERS EXCEPT #1
#3 WING RIB
#4 WING RIB
#5 WING RIB
#6 WING RIB
#7 WING RIB
#8 WING RIB
#9 WING RIB
#10 WING RIB
#11 WING RIB
#12 WING RIB
#1 ELEVATOR RIB
#2 ELEVATOR RIB
#3 ELEVATOR RIB
#4 ELEVATOR RIB
#5 ELEVATOR RIB
A .035"
WING SPAR
FIG. 2
ALUMINUM CLEAT - EDGE AND FLAT VIEWS
T.E.
T.E.
T.E.
BAMBOO TIPS FOR - WING
ELEVATOR
FIN
"T.E." INDICATES TRAILING EDGE
#4 FIN RIB
#3 FIN RIB
#2 FIN RIB
#1 FIN RIB

An Open Forum for Readers, What They Think, Do and Say, Presented So That All Who Read May Enjoy and Benefit by an Exchange of Ideas

MANUFACTURERS of midnight oil should have noticed a marked increase in their business, for model builders have been extremely busy thinking up new ideas and sending them in for publication in Slipstreams. Our space prevents us from publishing all of them. However, a few of these ideas follow which should prove interesting.

Perhaps some of you have tried out this idea, but it is very useful, so we submit it for the benefit of newcomers to the field of aviation. It is sent in by Denton Stockton.

Wood Drill

A wood drill may be easily made from an ordinary needle. The accompanying sketch illustrates how it is accomplished. Grind the "eye" end of the needle to a chisel edge, using an oil stone. When finished it should have the appearance of a very small screw driver with a split shank. The pointed end of the needle is held in a chuck or pin vise when in use.

In operation, the sharpened edge of the "eye" bites into the wood, while the "eye" itself cleans the cut. Frequent removal of the drill from the work cleans the "eye," making a neat hole. This drill is especially adaptable to drilling holes in propeller blocks, using a pin vise to hold the drill.

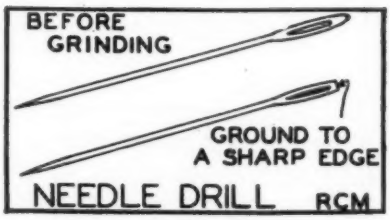


Fig. No. 1

Has anyone a better suggestion for a drill tool?

William Tracy sends us a novel method of applying streamlining to wheels. He says:

Streamlining Wheels

"Many model airplane builders are now using pants for their model planes, chiefly for the sake of appearance. These pants add to the looks of a plane, but frequently ruin good landings by catching on obstructions. Pants are not as effective as most model builders think. As a matter of fact, they increase the air resistance rather than diminish it, because the model airplane travels at a very slow rate of speed as compared with the speed of a real plane. The pants of a model plane have to be quite large in order to permit the wheels to roll easily and this increases the surface area to such an extent that the advantages gained by streamlining are lost in surface friction.

"Here is an idea that will give a model plane the appearance of having real pants and at the same time will permit good landings, really act as an effective streamlining for the wheels and make the application of shock absorbers easy.

"A balsa fairing is made to fit the wheel,

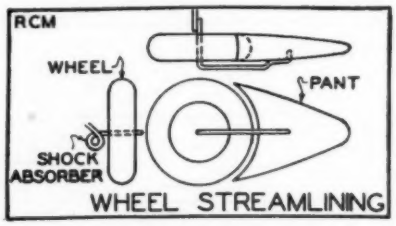


Fig. No. 2

as shown in Figure No. 2, using the front edge of the wheel for the leading edge of the streamlining and the fairing for the trailing edge of the pant. This fairing is attached by bending the extended axle at right angles and gluing the fairing to it."

Here is a little help for those who wish to build tools for their shop. We are indebted to Roy I. Lee for the idea. He says:

Balsa Wood Cutting Tool

"I highly appreciate the Slipstreams pages. They have helped me in a number of things, as well as given me something to study out.

"Here is a balsa wood cutting tool. It is one that I have been experimenting with long before there were any on the market, or at least I had never seen any advertised.

"Diagram No. 3 should explain quite well how it is made. You will see that the cutting edge is made from any double-edged razor blade, though preferably the Gillette type blade because of its thinness. Three pieces of hard wood are also needed. Wood piece B governs the thickness of the piece to be cut. For example, if B is made from a piece ⅛" thick, then the tool will cut strips ⅛" thick.

"Next a small amount of .020 music wire for a spring is needed. This spring keeps the wood down flat; also five bolts or rivets (bolts are preferred). They should be 1/16" to 3/32" in diameter and 1⅛" to 1½" in length. The last piece is a piece of bamboo shaped as shown in the diagrams and is slightly smaller in width than the width of piece B. It is shaped as shown so that the thumb on the left hand holds the piece from sliding back. This bamboo piece is used so that the spring will not press into the soft balsa wood; it is placed under the tension spring between piece A and the razor blade, directly on top of the balsa wood that is to be cut. Adjust the tension spring so that it presses quite tightly against piece B.

"Perhaps a clearer idea may be had if I give size directions for making the tool. First find a piece of hard wood for A, size 1/16" thick x 2" wide and 4" or more long. Next decide the width of the strip you want cut; for example, let us say ⅛"

(Continued on page 47)

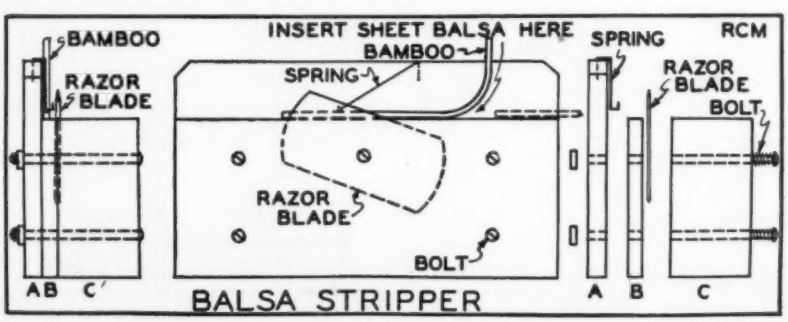
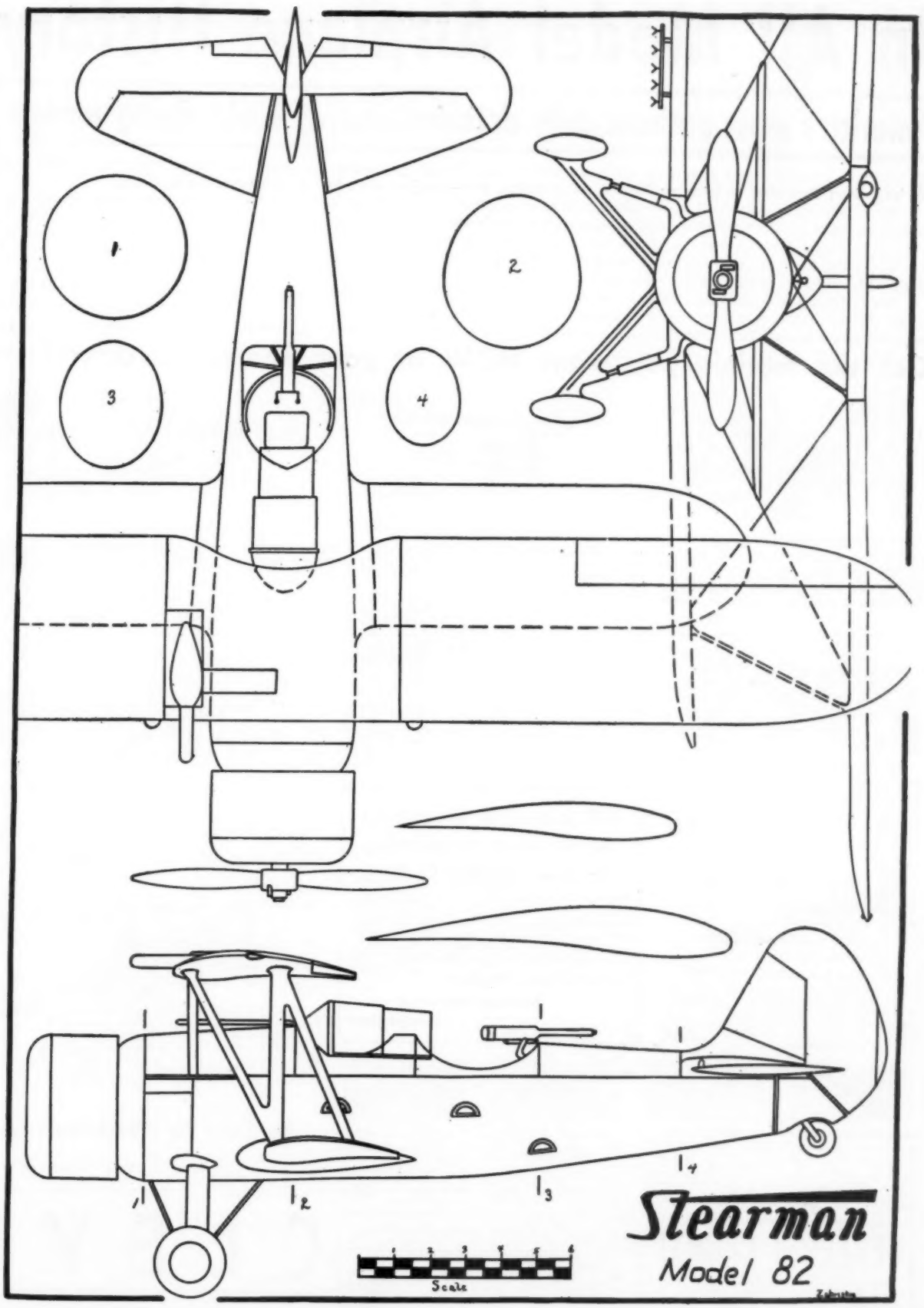


Fig. No. 3


1
2
3
4
1
1 2
1 3
1 4
Scale
Stearman
Model 82

In All Model Airplane History—

America's most authentically detailed line of scale flying models at

THAT'S a broad statement we know—but we also know, from 16 years day-in-day-out experience, what we're talking about. Yes, even including purchasing liquids, in addition, too—*you just can't buy a better model anywhere!*

Remember we've pioneered more developments in model airplane design and construction than any other concern in the world—we have facilities for data and designing, for developing, for manufacturing and for field testing that many others never even dreamed of—or because of the tremendous expense and exhaustive research necessary, were way beyond their reach.

Remember also that we've done all these things for one—and only one—purpose—to give modelbuilders of America and the world the very last word in model airplane Kits—at prices every one can afford.

We've bought and examined dozens, yes scores, of Kits made by other concerns to see just what you get when you buy such Kits. We have one department in our organization whose job is just that—so when we say C-D's are the most authentically designed and complete line of flying scale models in America today, we're not just talking through our hats—we're telling you

Get the models you want NOW at your dealers or direct!—thes

U.S. ARMY BOEING P-12E

One of the prettiest of all army fighters. An excellent flying model. Span 15", length 10¼". Suggested coloring: yellow and olive drab, with beautiful red and yellow trimmings. Kit D-8C..... **65c**

CURTISS P6-E ARMY HAWK

Even exhibition models could not outclass this new beauty for external appearance—and she flies very well, too! Suggested coloring: the usual yellow and olive-drab of the Army with the beautiful color marking of the Selfridge Field Squadron of its characteristic black and white; with black lettering and red striped top wing, along with the red, white and blue insignias. The "super" authenticity takes this model out of the model-building class of hobby work into one of almost scientific precision duplicating. Every possible detail, wing ribs, stringers, etc., reproduced. Span 15¾", length 11 1/16". Kit D-21B..... **75c**

WEDELL-WILLIAMS

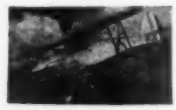
This model is a very beautiful and authentic version of the plane Jimmy Wedell himself flew to victory for the 1933 Cup. Capable of excellent speed flights. Suggested coloring: red with black scalloping and bronze motor crankcase and color separations. Span 10⅝", length 11⅛". Kit D-47..... **50c**

GB SUPERSPORTS

Doolittle's 1932 T... son winner—and a b... Fast flights. Span 1... length 9". Suggested ...oring: white, red, ...loping. Kit D-27..... 5...

ROSCOE TURNER'S WEDELL-WILLIAMS

Another ship needing no introduction since our beloved Col. Roscoe controls it wherever she goes. The '34 Thompson Trophy winner. Fast flying model. Suggested coloring: Wedell-Williams Gold. Has a span of 13", length 11". Kit D-48..... **50c**



HIGH-SPEED FURY

British Hawker interceptor fighter. Now redesigned and beautifully striped top wing and fuselage, lettering under wings, etc. Long, fast flights. Span 15", length 13". Suggested coloring: All silver. Kit D-20B..... **45c**

AERONCA C-3

True in detail, beautiful in appearance, exciting in flights. Instantaneous model "hit"! Very easy for beginners. Span 18", length 10¼". Suggested coloring: Red and silver. Kit D-40..... **60c**

COMPER SWIFT

Redesigned. ...ights. Span 12", ...9". Suggested ...beautiful green, ...black fuselage de...sign. Kit D-33B... 3...

DOUGLAS O-38 OBSERVATION

Very beautiful and unusually well detailed model. Authentic only as "Cleveland" makes 'em! Span 20", length 15¼". Suggested coloring: yellow, olive drab, black details. 2 pilot blocks. Kit D-43..... **85c**

All models pictured here also available in 3-4" scale C-D's

They are the famous super-complete Kits containing wood entirely printed out, all dopes, cements, tissue, wire, washers, turned wheels and necessary turned parts, fibre propeller blades, hubs, etc., etc. Moreover, there are 21 other models in addition to those pictured here.

Send 5c for complete catalog showing entire line

NAVY BOEING F4B-3 (or-4)

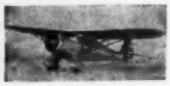
Beautiful flying miniature of the masterful fighter now used by the Navy. Exciting to build—thrilling to fly. Capable of fairly long flights. Span 15", length 10¼". Suggested coloring: silver, yellow and red. Kit D-29..... **65c**

LOCKHEED VE...

A picture for beau... wonder for flights. ...20½", length 14"... gested coloring: ...red and cream. Kit D-24..... 8...

TRAVEL AIR MYSTERY

Completely redesigned. Span 14½", length 10½". Beautiful solid appearance. Suggested coloring: red, black scalloping, green trim. Kit D-2D..... **50c**



MONOCOUPE

Span 16", length 10¼". Suggested coloring: Beautiful cream and orange. This design has won many first prizes for model-builders. Kit D-28B... **45c**

A-W QUAD FIGHTER

Very unusual. Steady flyer. Now authentic rib spacing. Easy to build. Span 14", length 12¼". Suggested coloring: red, white and blue. Kit D-11..... **45c**

LINCOLN SPORT

A lightplane sensation. Beginner's model. Span 10", length 8 1/16". Suggested coloring: cream, black trim. Kit D-36..... **25c**

WACO C-3

Very popular cabin p... Span 16½", length 1... Suggested coloring: ...and red. Kit D-37..... 7...

Be Sure to Read Instructions B...

IF ORDERING DIRECT—add 10c per Kit for packing and han... WHERE. If half dozen or more are ordered at one time, the... —send check, or money order—cash at your own risk. Shipm... British Isles, add 10% to above prices; other foreign countries...

DEALERS! CLUBS!

Repeat orders from model airplane departments, dealers and clubs are pouring in. Here's the fastest-moving model setup yet offered. If you're not already selling these new low priced C-D "Dwarfs" (1/8" scales) and the standard ¾" scales, write or wire immediately for full details. You'll be excitingly surprised at the profitable business you'll get when handling America's most popular model line—"CLEVELAND."

CLEVE...

MODEL & SUPPLY CO. INC. 1866NF West 57... CLEVE...

othing Ever Before Like This!

s ONE FIFTH to ONE HALF what you pay for ordinary models

ething that's as true as you're a foot high. But you don't have to take our word—*make the comparison yourself.*

Everyone who knows anything about models will tell you the same thing—that C-D's are the finest scale flying models le. All right—now—in our new line of Dwarfs (½" scale) models we are giving you in the Kits to build them everything offer in our famous ¾" scale line—except NO LIQUIDS. The models are identical with the ¾" line but they're just one- d smaller. And the prices are absolutely revolutionary—nothing over 85c.

Small wonder, then, modelbuilders are buying these C-D "Dwarfs"—not a Kit at a time—but 3, 4, 6, even 10 at a time! The remely low prices permit it—and enable a modelbuilder to really "go to it" in his hobby. Incidentally at these low prices, lers can carry larger stocks of C-D models—so talk to your dealer, get him to put in a complete line of Dwarfs—he'll sell of 'em. If your dealer hasn't the "Dwarfs" yet, and you have to order direct from us, please mention his name and the e he operates (whether department, model, hardware, sporting-goods, etc.) and we'll send him our Dealer's proposition.

prices enable you to buy a number of them at one time!

VOUGHT CORSAIR V-65

ither of the new 2-place Corsairs r V-80). Super detailed, extremely . Embodies all new Cleveland fea- Span. 18", length 13¼". Suggested : blue, yellow, red, black and Kit D-41..... **85c**

HOWARD RACER "IKE"

Information on this design is supplied both as the four or two wheel "Ike" and the two wheeled "Mike." Flies and climbs beautifully. Span 10⅛", length 8½". Suggested coloring: white with black details, lettering. Kit D-42, only..... **25c**

SUPERMARINE S6.B

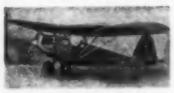
Greatly improved model of this Schneider Trophy winner, which will R.O.W. Radiators and other unusual features. Span 15", length overall 14½". Suggested coloring: silver and blue. Kit D-19..... **65c**

BOEING P-26 STANDARD PURSUIT

Formerly the XP936. Very popular. Much imitated. The most modern pursuit model of a low wing design. Authentically detailed to the tiniest gadget. Span 14⅛", length 12". Suggested coloring: yellow and olive drab. Kit D-23..... **65c**

EAT LAKES SPORT TRAINER

the prettiest ls available. build. Excel- hts. Includes 's latest and loads of Span 13⅜", th 10⅛". Sug- coloring: or- cream. -16..... **65c**



HEATH PARASOL

Span 15½", length 8½". Suggested coloring: mostly orange, decorative black fuselage side panel. Excellent for beginners, and a duration flyer data. Kit D-26B..... **35c**

How to Save an Extra 60c

Since C-D "Dwarfs" sell for such a reasonable price, don't content yourself with ordering merely one or two models—order six or more at a time, thereby saving 60c or more on the packing and handling charges, for such really worthwhile bargains in the way of advanced Kits cannot be purchased elsewhere at any price (on orders for less than 6, we require a 10c handling and packing charge per Kit). Always keep a supply handy. Since no liquids are supplied, you may save money by buying larger quantities of cement and paper cement, as well as dopes, or you may use what you have on hand, employing any color you desire for the different ships, for we list only "suggested coloring" in the description of each model.

NAVY CURTISS F11C-2

The plane which needs no introduction as it has already made an excellent name for itself in Navy work. Beautiful flying model. Suggested coloring: the characteristic silver with gray fuselage, green tail surfaces, cowl and other trimmings, and yellow upper wing. Span 15¾", length 10⅝". Kit D-49..... **85c**

Add 10c *per* kit (packing-handling) to these prices—if ordering less than six.

OMPSON TROPHY INERS!

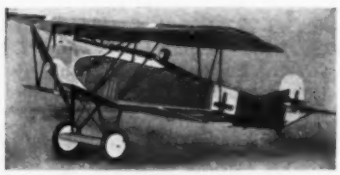
dels from 1929 D-3-46-17-27- ny 50c each. l. If you pur- individually, e extra for and handling, or more are no extra be included. and your $3.00 ix models.

BAYLE'S GEE-BEE

1931 Air Race sensation. Span 11⅝", length 8⅛". Suggested coloring: yellow and black. Kit D-17B..... **50c**

BOEING 95 MAIL

Easy for beginners. Redesigned for beauty and even greater duration than ever before. Span 22 3/16", length 16". Suggested coloring: blue and silver. Kit D-32B **85c**



FAMOUS WARTIME FOKKER D-7

A really authentic steady flying beauty so realistic that it looks as though it was drawn right from the ranks of one of the famous German "Flying Circuses." Wings taper beautifully, new feature control movements (not from cockpit), scale propeller, authentic spandau guns (you make all). Suggested coloring: international orange, green, white, black details. Span 14⅛", length 11¼". Kit No. SF-15B..... **60c**

All Pictures here are C-D Models

Because all C-D "Dwarfs" are authentic scale models, we are able to use, as you'll notice, the same photographs as in previous ads—for whether the models are ½" or ¾" scale, the finished job in appearance is precisely the same. The photographs could not be told apart.

HOWARD "PETE"

An easy-to-build Air Race model—fine flights. Span 10", length 8⅜". Suggested coloring: all white, black details. Kit D-18B..... **30c**

Famous '30 LAIRD SOLUTION

It was piloted to victory by the late "Speed" Holman in the Thompson Trophy Classic. Model flies like the Super-Solution—at a fast clip. Suggested coloring: gold wings and tail surfaces, balance black. Span 10⅝", length 9⅛". Order Kit D-46..... **50c**

Before Ordering

e. We always pay postage ANY- ing or handling charge. No C.O.D.'s 3TS rushed. To Canada, Mexico and

A N D

CLEVELAND, OHIO, U.S.A.

If your dealer can't supply you—order direct. We offer streamline delivery service—but we urge you first to go to your dealer, as more and more dealers are putting in a complete line of the C-D "Dwarfs"—or, why not get your dealer to do so, if he still does not stock them. If ordering direct, please mention his name and address, so we can write him. Above all—*send 5c at once for a complete Catalog of C-D "Dwarfs," and our standard ¾" scale line of 50 models, and C-D supplies.* Do it NOW!

MODELBUILDERS!

NATIONAL AERONAUTIC ASSOCIATION JUNIOR MEMBERSHIP NEWS

Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.

Get Your Model Planes Ready Now for the National Championship Meet New Records and New Champions Likely at St. Louis June 27-29

JUNIOR N.A.A. members from coast to coast and from border to border are grooming delicately tuned model airplanes for that greatest of all model plane occasions, the 1935 National Championship Model Airplane Meet to be held in St. Louis, Mo., June 27-29, Thursday through Saturday. And St. Louis is going to be ready for them as only St. Louis knows how.

The meet is being conducted under N.A.A. sanction by the St. Louis Junior N.A.A. Chapter and its sponsor, Stix Baer & Fuller Company. Every air-minded organization in the city is joining in the sponsorship to make the meet one of the greatest of all time. The Chamber of Commerce, the Advertising Club, Municipal Airport Association, St. Louis Police Board; these are just a few of the organizations who are lending their support.

The most important part of the whole meet, championship model flying, is of course being given primary consideration. The very best conditions possible are being provided. Outdoor flying will be conducted on Lambert Field, the municipal airport. This field has witnessed much of aviation's history. It is well known to Colonel Lindbergh and a host of other famous fliers. Numerous highways parallel the field and will facilitate recovering long distance models as well as enabling the timers to keep the models in sight for prolonged times. Indoor flying is to be in the St. Louis Arena, one of the best buildings in the country for this purpose. The ceiling is 135 feet high at the center and is free of pillars and girders that would offer interference. The floor over which the models will fly is approximately 140 by 300 feet and is surrounded by box seats which may be used as "pits" by contestants. This offers a safe place to adjust and repair models and to store boxes and other equipment.

For entertainment, the sponsors are providing so much that no single contestant can possibly take it all in. There will be big-league baseball, swimming, movies, sightseeing, free lunches at noon on the contest days, the big final banquet, and other events too many to name. And best of all, you do not have to go to any of the entertainment features unless you really want to. It is simply being made available for those who care to take advantage of it.

All this is being offered to Junior N.A.A. members regardless of age or residence. Make sure your membership is in good standing as it will be necessary for all who register to show their membership cards. Nobody can compete or take part in the specially featured events of the three-day program unless he is a member of the National Aeronautic Association. There is just one exception to this. Anyone over twenty-one who is not a regular member, may obtain a special permit from the Association for one dollar that authorizes him to take part in model plane contests for a period of one year. And don't forget, the meet is in-

John Stokes, 1934 Indoor Junior Champion, being congratulated by Wiley Post. Major "Jimmie" Doolittle and Mayor Myers of Akron approve.

tended for girls, too. Let's see several of them win prizes this year.

The awards list is particularly attractive. There will be the traditional N.A.A. Championship Trophies and Cups. There will also be additional first place awards of real merit. The total prize list will number more than 150. It simply is not possible to enumerate all the awards, there are so many. Besides, the sponsors want some of them to be surprises. Just take a tip; try to be one of the winners. More information about this will be given you in your instructions that you will receive with the official entry blanks.

After May 10 you may write for entry blanks and full information to the Model Airplane Contest Director, Stix Baer & Fuller Co., St. Louis, Mo. Enclose with your request a large envelope, stamped and self-addressed. Entries close June 20, so do not delay until too late. The instructions which you will receive with the entry blanks contain full rules and specifications for building your models. The meet will be conducted in full accord with N.A.A. model plane rules for competition.

The cost of attending the meet is as low as can be arranged. Special hotel rates will be provided, transportation in St. Louis will be at a minimum, two lunches and the big banquet dinner are free to all contestants and officials. N.A.A. members who come to the meet but do not compete will not be entitled to the lunches and banquet free of charge but will have the privilege of special hotel rates. These visitors will also be permitted to attend the banquet at a nominal charge and everything possible will be done to make their visit to the meet a happy one.

Many cities or groups are already planning to send one or more representatives to the meet with expenses all paid. These fortunate individuals have proved their ability by winning local elimination contests. If your community has not made similar plans, try to promote the interest of local officials and win such a trip for yourself. But even though you can't win a trip and feel that your ability is equal to that necessary for successful competition, you are eligible to enter the meet and should try to be there.

The scheduled contests and a brief description of the requirements are given here for the benefit of those who want to make early preparations. Complete details and a full digest of the meet rules may be obtained when you write for official entry blanks.

NONFLYING EXHIBITION SCALE MODEL CONTEST for MODEL AIRPLANE NEWS TROPHY. Open to all ages. Models must not exceed 48 inches in any dimension. Must be in St. Louis not later than June 20. Contestant need not accompany model.

OUTDOOR STICK MODEL CONTEST, Hand-launched. Those under 21 years of age compete for Mulvihill Trophy. Those over 21 compete for Balfour Trophy. Any type of stick model over 100 but under 300 square inches main wing area. N.A.A. weight rule.

OUTDOOR FUSELAGE MODEL CONTEST, R.O.G. Those under 21 compete for the Stout Outdoor Trophy. Contestants over 21 compete for special trophy. N.A.A. weight rule fuselage models of more than 100 but less than 300 square inches main wing area.

MOFFETT INTERNATIONAL CONTEST. Unlimited as to age of contestant. Team of six members may represent any one country. American and Canadian teams will be selected by elimination flying at St. Louis. Other foreign entries may be flown by proxy. For N.A.A. weight rule fuselage models over 100 and

under 200 square inches of wing area.

OUTDOOR GASOLINE-POWERED CONTEST for Fuselage R.O.G. Models that are powered with internal combustion engines. Those under 21 but over 17 years of age compete for the TEXACO TROPHY. Those over 21 compete for special trophy. Models must not weigh more than seven pounds. Fuel allowance is one quarter ounce for each pound of model's weight.

INDOOR STICK MODEL CONTEST, Hand-launched. Those under 21 compete for the STOUT INDOOR TROPHY. Those over 21 compete for SPRINGFIELD TROPHY. Any type of stick model whose wing area is less than 150 square inches.

INDOOR FUSELAGE MODEL CONTEST, R.O.G. Those under 21 compete for BLOOMINGDALE TROPHY. Those over 21 compete for special trophy. Any type of fuselage model whose wing area is less than 150 square inches.

If weather conditions are favorable the outdoor flying will be held on Friday, June 28. Otherwise the indoor flying will be held on that day and the outdoor contests put over until Saturday, the 29th. Thursday, June 27, is intended for registration and sightseeing. There will be no contest flying on Thursday.

New Junior N.A.A. Chapters

ATLANTA, Georgia, Model Airplane Club has been granted a Junior N.A.A. charter, having recently organized with thirty-five charter members. This club is one of great experience and has made notable progress in the past few years.

Mr. J. K. Coppage, a civil engineer in the U.S. Government service, is club adviser. The club president is Bill Paxton, Jr.; Bernard Karp is vice-president, and Frampton Ellis, Jr., is secretary-treasurer.

Regular meetings are held every Saturday at 12:15. Contests are conducted at frequent intervals. The club dues are ten cents a week, this money being used for the benefit of the club in the purchase of prizes, etc.

Mrs. Minna Miller Hamilton of Miller's Inc., 64 Broad St., N.W., is the club sponsor. Either Mrs. Hamilton or the club president, whose address is 620 Bonaventure Ave., N.E., will be pleased to receive inquiries from anyone in the vicinity of Atlanta who is interested.

PITTSBURGH has a newly formed Junior N.A.A. Chapter known as GIMBEL'S PITTSBURGH Model Airplane Club. Gimbel's store is club sponsor and is to be congratulated on its interest in model aviation. Pittsburgh has long been an active model airplane community and great strides are expected in new activity now that there is an official N.A.A. model plane group organized there.

Mr. Robert K. Allen, 7114 Race Street, is club adviser. He has had considerable

OFFICIAL MODEL AIRPLANE RECORDS

Approved by Contest Committee of the N.A.A.
Through April 1, 1935

INDOORS

STICK MODEL AIRPLANES. Hand-launched

CLASS B

Junior: John Whitehouse	Springfield, Mass.,	13m 04s
Senior: Ralph Kummer	St. Louis, Mo.	17m 49.8s
Open: Michael Lichstein	Philadelphia, Pa.	14m 45.8s

CLASS C

Junior: John Stokes	Huntingdon Valley, Pa.	18m 53.4s
Senior: "Pete" Andrews	Philadelphia, Pa.	20m 22.8s
Open: Carl Goldberg	Madison, Wis.	22m 59.4s

STICK MODEL AIRPLANES, R.O.G.

CLASS A

Junior: Joseph Pruss	Philadelphia, Pa.	10m 25s
Senior: Merrell Malley	Atlantic City, N. J.	10m 56.4s
Open: Michael Lichstein	Philadelphia, Pa.	8m 40s

CLASS B

Junior: Louis Shumsky	Atlantic City, N.J.	9m 15.2s
Senior: William Latour	Philadelphia, Pa.	14m 40.2s
Open: Michael Lichstein	Philadelphia, Pa.	11m 06s

STICK MODEL AIRPLANES, R.O.W.

CLASS A

Junior: William Wert	Philadelphia, Pa.	3m 46s
Senior: Paul Karnow	Philadelphia, Pa.	5m 01.4s

CLASS B

Junior: James Mooney	Philadelphia, Pa.	8m 37.6s
Senior: Mayhew Webster	Philadelphia, Pa.	11m 55c

GLIDERS, Hand-launched

CLASS A

Junior: Kenneth Nelson	Boston, Mass.	26.6s
Senior: David B. Hecht	New York City	34.4s

CLASS B

Junior: Louis Young	Boston, Mass.	27s
Senior: David B. Hecht	New York City	31.6s

CLASS C

Junior: Stanley Congdon	Glen Ridge, N.J.	17s

AUTOGIROS

Junior: Raymond Steinbacher	Ridgefield, N.J.	57.2s
Senior: Alton H. DuFlon, Jr.	Ridgefield, N.J.	2m 01.2s

FUSELAGE MODELS, R.O.G.

CLASS B

Junior: Hyman Oslick	Philadelphia, Pa.	7m 59.6s
Senior: Herbert Greenberg	Newark, N.J.	12m 23.5s
Open: William Latour	Philadelphia, Pa.	6m 48s

CLASS C

Junior: Hyman Oslick	Philadelphia, Pa.	12m 59.4s
Senior: Emmanuel Enderlein	Philadelphia, Pa.	13m 24s
Open: Jesse Bieberman	Philadelphia, Pa.	6m 31.2s

FUSELAGE MODELS, R.O.W.

CLASS B

Junior: John Stokes	Huntingdon Valley, Pa.	3m 23s
Senior: Bruno Marchi	Boston, Mass.	3m 11s
Open: William Latour	Philadelphia, Pa.	5m 42s

OUTDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS C

Junior: Bruno D'Angelo	Philadelphia, Pa.	8m 29.4s
Senior: Vernon Boehle	Indianapolis, Ind.	15m 00s
Open: Bernard Collins	Providence, R. I.	3m 23s

CLASS D

Junior: Fred Skafec	Akron, Ohio	8m 21.6s
Senior: Ralph Kummer	St. Louis, Mo.	20m 54s
Open: Michael Marco	Springfield, Mass.	1m 52s

GLIDERS, Tow-launched

CLASS C

Senior: Bob File	Columbus, Ohio	23m 13s

CLASS D

Junior: Stanley Congdon	Glen Ridge, N. J.	45.2s
Senior: Fred Korn	New York City	1m 16.2s

AUTOGIROS

Senior: Ralph Kummer	St. Louis, Mo.	2m 06s

FUSELAGE MODELS, R.O.G.

CLASS C

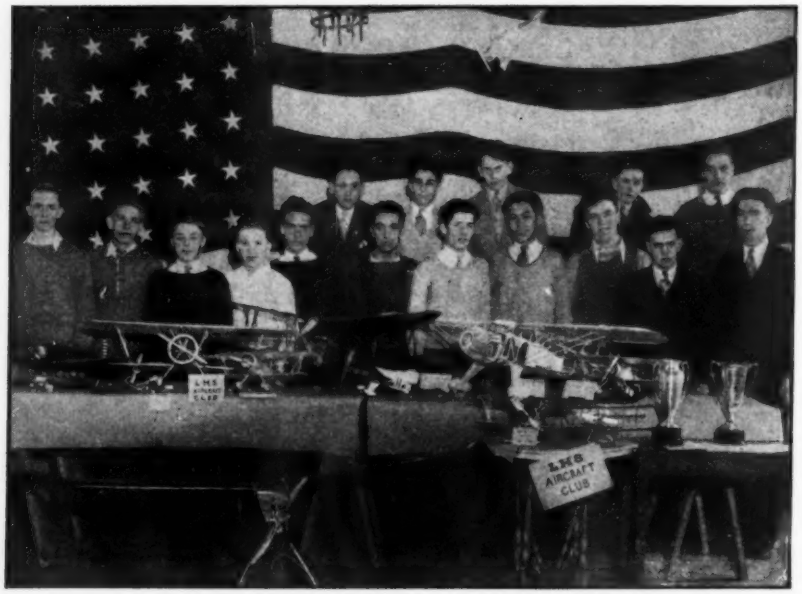
Junior: Donald Mertens	Erie, Pa.	1m 44s
Senior: Russell Yungbluth	St. Louis, Mo.	11m 35s
Open: Bernard Collins	Providence, R. I.	2m 56s

CLASS D

Senior: Vernon Boehle	Indianapolis, Ind.	8m 43s
Open: Michael Lichstein	Philadelphia, Pa.	1m 28s

CLASS E (Gasoline Engine)

Senior: Maxwell Bassett	Philadelphia, Pa.	21m 57s
Open: Carl V. Carlson	Chicago, Ill.	6m 48.5s



The Lyndhurst High School Aircraft Club with part of their exhibit.

experience in club promotion work and model airplane building and flying. Mr. Allen writes that plans are being worked out whereby Pittsburgh will have representatives at the National Championship Meet in St. Louis.

Anyone who is interested in membership in this fine club, may reach Mr. Allen either at his home address or at Gimbel's store.

LYNDHURST, N.J., High School Model Aircraft Club is the name of an organization which has just been granted a Junior N.A.A. Charter. This group comes into the N.A.A. with twenty-five members, many of whom are experts.

Mr. Michael Filippone, an instructor in the school, is club adviser. Mr. Charles J. Tlush is club director. His younger brother, Francis Tlush, is president.

The club's outdoor flying field is Teterboro Airport, not far from Lyndhurst. This is where the club is holding its annual outdoor meet on April 27, which promises to be one of the outstanding meets of the spring season. Recently, the L.H.S.M.A.C. held an exhibit that comprised a complete display of all manner of aviation material.

OMAHA, Nebr., has not yet formed a Junior N.A.A. group, but Vic Sorensen has succeeded in starting action in that direction. He has interested Mr. Earl R. Lane in becoming club sponsor. They have obtained the use of the entire basement of a business building and have set up tables and benches for the use of club members.

Sorensen and four other experienced model flyers are acting as instructors for the beginners of the group. It is expected that a group of about fifty will soon be organized and regular meetings and contests will be arranged. This club has an energetic booster and we all wish Sorensen success. All who wish to may write to Vic Sorensen, 2918 Spaulding St., Omaha, Nebr.

News from the Chapters

BOSTON'S Jordan Junior Aviation League, the Junior N.A.A. organization in that city, held its monthly indoor meet in the Irvington Street Armory on April 6. No national records were established but three Boston records were bettered.

Captain Willis C. Brown, the club's director, writes: "The meet was quite spectacular and the boys seemed to have more than the usual fun out of it. The three new Boston records represent an improvement. Fleming has always had trouble in staying low enough to make records, but this time after lodging his only fuselage ship in the girders at the very top on its first flight with only 800 winds, he then tamed his tractor stick model and turned in a good flight.

"Phillips' fuselage ship climbed to the very top, hit a girder and dived to within six feet of the floor before it came out and then climbed right back up top again. Before landing it had hit girders, lamps, wires and ropes nine times."

Results of the meet:

Class B Stick, Hand-launched, Senior, Torrey Capo, 7 min. 05 sec.

Class C Stick, Hand-launched, Junior, Levy Walba, 8 min. 17 sec. Senior, Thomas Fleming, 11 min. 29 sec. (Boston record)

Class C Fuselage, R.O.G., Senior, Hewitt Phillips, 7 min. 11 sec. (Boston record)

Class B Fuselage, R.O.G., Senior, Torrey Capo, 6 min. 05 sec. (Boston record)

Class A Glider, Hand-launched, Senior, Hewitt Phillips, 27 seconds. Junior, Louis Young, 24 seconds.

Class B Glider, Hand-launched, Senior, Torrey Capo, 26.6 seconds. Junior, Paul Durup, 13.4 seconds.

It is thus seen that Capo and Phillips are making quite a race of it to see who wins the prize trip to St. Louis as a reward for scoring the most points in regular meets during the year.

PHILADELPHIA Model Aeroplane Association held its fifth N.A.A. Indoor Meet on March 2. One new record was established when William Wert, aged 14, flew his Class A, R.O.W. Stick Model for the excellent time of 3 minutes 46 seconds.

This is more than four seconds better than the previous record held by another Philadelphia member, James Shivler.

NEWARK, N.J., Bamberger Aero Club, held its final indoor meet of the season on March 30. This meet was to determine who would represent the B.A.C. at the Nationals in St. Louis and William Sherwood turned up as the winner of the trip. His points in this and the previous meet were sufficient to top all other contestants.

Results of the meet:

Baby R.O.G.; Walter Skokna, 1st; Victor Bobson, 2nd; William Kozhatis, 3rd.

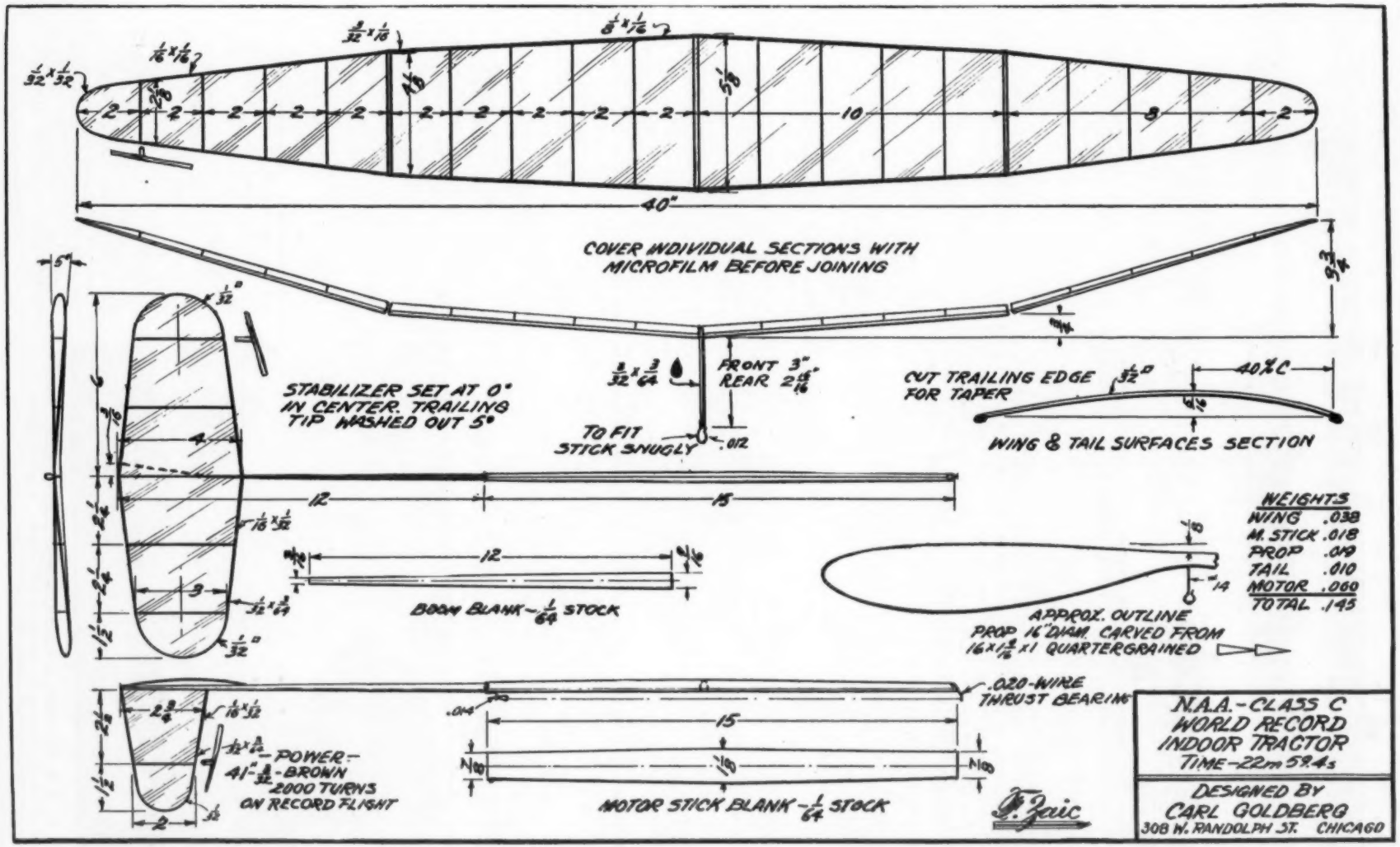
Fuselage Model; Walter Skokna, 6 min. 42 sec., Herbert Greenberg, 5 min. 04 sec., Raymond Steinbacher, 4 min. 08 sec.

Stick Model; William Sherwood, 7 min. 24 sec., Gordon Holbrook, 7 min. 10 sec., G. Brown, 6 min. 35 sec.

Wingless Autogiro; Herbert Greenberg, 43 seconds, Raymond Steinbacher, 15 seconds.

REDLANDS, Calif., is to have a model airplane meet on May 12, embracing the southern part of the state. There will be rubber-powered models and gasoline engine models. It is planned to make this an annual affair.

Those who are interested may have full information from Mr. Edward Swan, % Gair's, Inc., 218 Orange St., Redlands, Calif.

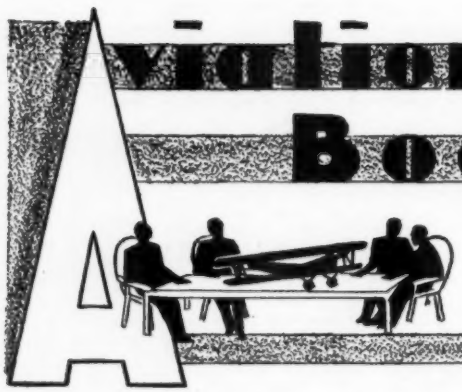


The Goldberg World Record Model

THIS month's N.A.A. model plan is of the ship with which Carl Goldberg established the world record indoor flight of 22 minutes 59.4 seconds at the 1934 National Championship Meet in the Goodyear-Zeppelin Air Dock at Akron, Ohio.

This flight is the longest ever made officially indoors and might easily have been surpassed had Carl elected to try a second or third flight. However, he made only one flight and the present record was the result. This model is of such merit that it might serve as a guide for indoor enthusiasts for years to come. The N.A.A. is fortunate, indeed, to be able to offer Goldberg's design to its junior members.

Carl promises to attend this year's meet in St. Louis and reports that he has a few improvements on his present design and hopes to show a longer flight than 25 minutes. For the benefit of those who may want to write him his address is now, 308 W. Randolph St., Chicago, Ill.



Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U.S. Army

SOMETIMES we wonder if there are any questions that young men can ask which we have not answered at some time in the past. However, each month we are surprised to find that our readers think up many new ones. It appears that many model builders do not confine their activities to model plane designing, but have been drawn into the field of large airplane design by their intense interest in aviation.

Claude Icard of Valdese, N.C., wants enlightenment on the following questions:

Question: What horsepower motor would be required for a light plane racer with a wing span of fourteen feet, an area of thirty-two square feet and a length of ten feet, nine inches?

Answer: Such a plane could be made to fly with as little as twenty horsepower. However, no exact figure for horsepower can be given because Mr. Icard does not state how fast he wishes his plane to travel. As long as there is one variable, unknown quantity in any problem, no definite answer can be given. It would be advisable to install a forty to fifty horsepower engine in such a machine.

Question: What is the smallest wing measurements a plane can have with a thirty or forty horsepower motor?

Answer: The measurements of the wing do not depend entirely upon the horsepower of the motor. Here again there are unknown quantities which affect the problem; namely, the weight of the machine, the weight of the pilot and the speed desired. Planes have been flown with as little as fourteen feet wing spread. A plane with a fourteen foot wing spread should have a chord not greater than two feet, nine inches. This would give an area of thirty-nine square feet. A plane with a normal wing section, traveling about 125 miles per hour, should lift about eight to ten pounds per square foot. Thus, we can say that the normal lift of this machine would be 390 pounds. If you can build a plane completely loaded to weigh this amount or less, it is obvious that such a ship will fly.

Here we have a question from George Zavodil of Smithtown Branch, N.Y.

Question: Can you give me the name of a good rubber lubricant?

Answer: Good rubber lubricants are sold by many companies who advertise in the pages of our magazine. However, a good lubricant can be made by mixing together one part glycerine and three parts of liquid green soap.

We have some interesting questions this month from F. Evans of Topside Farm, Hichman Mills, Mo. He asks:

Question: Is the age of sixteen too young to enter an aeronautical engineering course at college?

Answer: The age of sixteen is not too young to enter such a course if your mental and physical development is such that you can fully reap the benefits of pursuing such a course at this age, and if the college will accept you. Usually colleges do not accept students under the age of seventeen.

It is our opinion that such an age is too young. A student will be able to comprehend this subject to a greater extent and to obtain much more benefit from such a course if he is more matured than young men usually are at the age of sixteen. If you are ready to enter such a course at sixteen we would advise that you wait a year or two and take up some practical work during this period. It will give you a background and perspective that will be helpful.

Question: Is this profession crowded?

Answer: At present this profession is not crowded. However, there are a great number of young men who are taking it up. The number is increasing with the passing of each year. May we advise you in deciding on a profession which you will follow, that you do not consider the number of persons active in the field. Many young men start out in life and follow the wrong pursuit because of such influence. The only thing to take up is the subject for which you are best fitted, regardless of how many are following this pursuit. There is one important thing to remember; that in any profession which is lucrative you will find a multitude of people struggling to make a living. Do not try to avoid competition in your field. If you do, it is likely that you will find yourself in a position which will give you little reward and success for your efforts. The more competition one has, the more he will learn about his subject, provided he is industrious and tenacious. If you have the latter quality to a large degree you will be successful without question, regardless of the number of people with whom you are in competition.

Question: Where is there a college that offers a good aeronautical engineering course that is near Kansas City, Mo.?

Answer: We advise you to go to the board of education or to some official connected with your public school system for this information. He will put you in

(Continued on page 32)

The Grumman F2F-1. It is the fastest accepted U.S. Navy fighting plane. A Wasp Jr. of 650 hp. drives it at 265 m.p.h. It cruises at 220 m.p.h. A novel feature is its retractable tail wheel and landing gear

touch with the proper schools to consider.

Al Bercov of 1842 North San Fernando Road, Glendale, Calif., wants to know the answer to the following:

Question: In planning a flying scale model of a low-wing plane in which the wing is built into the fuselage and is immovable, how does one allow for the weight of the motor?

Answer: If the center of gravity of the machine is to be calculated, the number of strands of rubber required must be estimated before the model is built; as well as its weight and the weight of every part of the model. The proper method of procedure has been explained in the November 1933 issue, in the article, "The Aerodynamic Design of the Model Plane." However, after you have several years of experience in model building you will be able to estimate very accurately the proper position of the wing and to design the construction so as to create a proper balance.

In scale models the procedure is to design the nose block, cowl, and wheels with sufficient weight to create a perfect balance at the center of lift. If your plane has been constructed and you find it out of balance, the only procedure possible is to add small weights to the nose or to the tail, as the case may require. In subsequent models the structure of the heavy end of the machine, whether the nose or the tail, may be designed lighter to create proper balance.

James Anton of Pittsburgh, Pa., is a little apprehensive as to what position he should follow in life. He says:

Question: I am interested in taking up aviation as an occupation. However, I am in doubt as to what branch of aviation to enter; engineering, piloting, etc.

Answer: If a man has a kit of carpenter's tools he can build a house or objects of similar construction. However, he would need machinist's tools to build a machine. This is merely a parallel case which illustrates your course to follow. What mental qualities have you and how well can you use them? Whether you take up engineering, piloting or any other branch depends entirely upon your qualifications for a particular branch in this industry. Have you the capacity to become an engineer? If you do not like sciences or mathematics, cross this off your list. If your desire for action is greater than your inclination for study, take up piloting. If you have the ability to become a business man take up the management or executive work in connection with aviation. If you are mechanically inclined without the possibility of going to an engineering school, you may become a mechanic in the manufacturing or maintenance departments of this industry. One of the best ways of determining your qualifications is to get into some branch of aviation and gain practical experience. Get a position in a shop or at some aviation field. You will then make intimate contacts with problems conected with the position which you hold. In this way it is possible for you to make your decision with greater intelligence and possibility for success.

SELLEY-TEX CONSTRUCTION SETS

PAT. APPLIED FOR

MARK A NEW ERA IN SIMPLIFIED MODEL BUILDING

VALUE

IDEA IN FLYING MODEL KITS

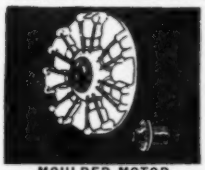
PLEASE READ EVERY WORD OF THIS IMPORTANT MESSAGE!

SELLEY announces an extraordinary achievement without precedent in the history of model building. SELLEY'S LEADERSHIP introduces a revolutionary advance in the creation of SIMPLIFIED MODEL CONSTRUCTION! SELLEY has junked the traditions of an industry to give you SELLEY-TEX, the MODERN METHOD of MODEL BUILDING, and whether the industry likes it or not, the old-fashioned methods must go. High pressure selling can no longer justify worthless kits that boys cannot assemble. SELLEY-TEX eliminates 60% of the difficulty found in obsolete balsa stick kits. The construction of SELLEY-TEX flying models is NOW so simple, SELLEY GUARANTEES that the AVERAGE BOY can successfully build and fly them. This cannot truly be said of any other model kits!

WHAT IS SELLEY-TEX?

SELLEY-TEX is a MOULDED FABRIC, practically indestructible, lighter and much stronger than balsa wood. It has been developed and manufactured EXCLUSIVELY for SELLEY. No longer need you shape the difficult and complicated parts of a model plane. They come to you perfectly moulded! It is only necessary for you to cement the moulded parts together in order to get a realistic and faithful reproduction of a FUSELAGE, MOTOR COWL, TANK, BOMBS AND WING GUN MOUNTS. SELLEY-TEX takes all the aggravation and perspiration out of model building! Here is a $10.00 VALUE at a FRACTION of its WORTH! Now SELLEY takes great pride in offering these masterpieces of authentic flying scale models to the boys of America. Buy SELLEY-TEX Kits, the construction sets of TO-DAY and the FUTURE! SELECT and ORDER YOURS NOW!

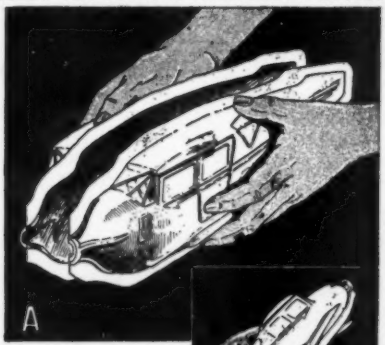
THE ADVANTAGES OF SELLEY-TEX CONSTRUCTION SHOWN IN PICTURES! SIMPLE AS A B C

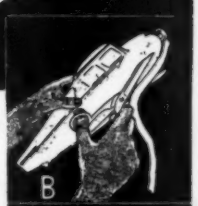


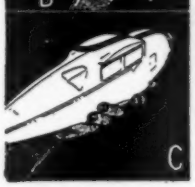
MOULDED MOTOR

MOULDED COWL

MOULDED BULKHEAD







A—Fit together and cement the two moulded parts of the fuselage.

B—Cut away the border of excess fabric.

C—The result is a perfectly shaped fuselage in the form of a hollow shell, very strong and indestructible. The finished SELLEY-TEX plane is lighter than a balsa stick model, thus assuring absolute superior flying performance.

AT LAST! THE MODEL BUILDER'S DREAM REALIZED! Here is the easiest and quickest way to build a model plane. Actually less work! Think of the saving of time and energy! The photographs show you how amazingly simple it now is to build the fuselage, motor with balancing ring, bombs, cowl, tank and guns. SELLEY-TEX kits makes your hobby a PLEASURE instead of a task!

MOULDED PANTS

MOULDED HEAD REST NOSE PIECE and BOMB

PROPELLER

Why pay even 10c for worthless kits you cannot assemble? Pay the difference and get HONEST value.

These are the lowest prices for which such incomparable quality can be offered.

BUY SELLEY-TEX kits, the SUPER-VALUE! The beauty, quality and performance of your SELLEY-TEX model will remain long after price is forgotten. Enjoy SELLEY-TEX construction. THE MODERN METHOD of MODEL BUILDING!

A FRANK STATEMENT ABOUT OUR BUSINESS

SELLEY wishes to apologize to the model builders of America. Last year an analysis showed us that only 2% of the boys who purchased balsa stick kits can actually complete a finished flying model. This is a general condition in the industry to-day!

That is why SELLEY invested THOUSANDS of DOLLARS in the creation of this sensationally new idea. We now offer you SELLEY-TEX Construction Sets, a PATENT APPLIED FOR method of model building which is the practical answer to your problem. TRY a SELLEY-TEX KIT and CONVINCE YOURSELF!

OUR GUARANTEE for YOUR PROTECTION

If the SELLEY-TEX kit you receive is not exactly as represented, or unsatisfactory in any way, RETURN it to us and we will refund your money in full.

Insist on SELLEY-TEX Kits to be sure it's a genuine SELLEY quality kit!

GOSHAWK

$4.00
25c Postage

GOSHAWK. A powerfully attractive flying scale replica of the speedy Navy fighter and accurate to the minutest detail.

The following SELLEY-TEX moulded parts: Fully detailed fuselage, bulkhead, head rest, balancing ring, drag ring, bombs, belly tank, wheel shoes, shoe fairing, tail wheel fairing and a special fully scaled 9-cylinder motor, detailed with push rods, all the fine scale parts and materials as listed complete this very extraordinary value!

IT'S THE SELLEY-TEX MOULDED PARTS THAT MAKE THE VALUE

Selley agrees with the experts, such as Casey Jones, Col. Chamberlain, etc., that there is no substitute for SELLEY-TEX moulded construction. The manufacturer of moulded parts takes more time, more money, finer materials and more skilful workmen—but it does make practical construction sets.

WACO C CABIN

$3.50
25c Postage

WACO C CABIN. A masterpiece of authentic model design, incorporating every scientific feature to insure maximum flying performance.

Fully detailed SELLEY-TEX moulded fuselage, bulkhead, balancing ring, cowl, cowl bumps, pants, pants fairing and a special full-scale 9-cylinder motor, with metal push rods and a special moulded celluloid cabin windshield; the many special scale parts and materials as listed complete this amazing value.

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SELLEY-TEX

ATTENTION DEALERS!

These nationally advertised EXCLUSIVE SELLEY-TEX KITS are a business stimulus. CASH IN on this opportune SALES CREATOR! Write at once for complete information propaganda and discounts.

A Model That Is Easy to Build and Fly

(Continued from page 5)

pulling the paper from one end, press the paper firmly to each middle rib. Stretch the paper from end to end, not from front to rear. When it is smooth, press the covering down to the front edge and then the rear edge. After this is accomplished, apply cement to the outer ribs and to the remaining part of the leading and trailing edges. Draw the paper tight over each end rib, pulling the paper from tip to tip. When you have adjusted it so that it is smooth and without wrinkles, press down the leading and trailing edge. It is advisable to do one end of the stabilizer at a time. Do not apply cement to the second end until you are ready to fasten the paper in place.

In covering the rudder, cut out the paper in the same manner and start cementing the paper with banana oil to the lower or wide edge. Apply cement to the framework and press the paper in place, drawing the paper from the rudder tip. Do not cement the leading and trailing edges until after the paper is fastened to the ribs. Trim the edges off and cement them down to the edges of the frame. When the cement is thoroughly dry, spray the paper surfaces very lightly with water. A fine atomizer is the best instrument to use. When the paper dries it will dry tight and smooth. However, while the paper is drying, be sure that the framework and the surfaces are held down tightly on some flat surface so that they will not warp out of shape.

Wing

The next step is to construct your wing. First cut out the ribs according to the outline in the drawing, making the notches for the spars as shown. You should make eight ribs. The front and rear spars are made of medium light balsa. They are 3/32" x ¼" in cross section and are 18" long. The center spar is 1/16"x¼"x6" long. Cement the ribs on the spar at the proper distances along their lengths, as shown in the drawing. Cement each rib in place. Do not put the center spar in place until all the ribs are fastened to the front and rear spar.

The next operation is to cement the rounded wing tips to the center ribs. These wing tips are cut from light balsa, with the grain running across the narrow width. They are one inch wide by three inches long. They should be cut to semicircular shape as shown. Be sure that one edge is absolutely straight.

These end pieces are now cemented to the upper edge of the under rib. Hold them in place with pins and make certain that they are curved so that their upper surface follows closely the upper curved edge of the rib.

Now cut the spars at the center so that the wing is in two pieces. Our next step is to form the dihedral on the wing; that is, raising the wing tips slightly above the center, as shown in the drawing. Rest the wing tips on two books or something which will keep them in place after you cement the two half wings together.

However, before cementing them, trim

the center ends of the spars, using sandpaper so that when the wing tips are raised two inches and are resting on the books, they fit neatly and snugly together. When they fit properly with the ends raised two inches, apply cement to the ends and join the two half wings at the center. Adjust the wing so that the frame is not warped while the cement is drying. After the cement is thoroughly dry, the next operation is to put on the thread trailing edge. Use Clark's No. 50 thread.

The last step is to round off the front and rear *lower* edges of the spars between the ribs. On the drawing there is a section, (X-X), which shows how these spar edges are rounded off. This is done in order to reduce the drag of the air. When the spars are rounded in this manner your ship will fly more smoothly. This rounding off process should be accomplished with the use of sandpaper.

Do not cut away the thickness of the spar at the center. Such a procedure will weaken the spar. The side view drawing shows how the spar is squared where it passes through the ribs and indicates how the lower surface of the spars are curved between the ribs.

Now you come to the operation of covering your wing with paper. Only half the wing is covered at a time. The paper is cut so that it is slightly larger than the wing. This leaves a border extending out on all edges which will be cut off later. Take one of the sheets of paper which are to cover one wing half and lay it over the wing from the center to the tip. The paper should not extend out over the balsa tips more than a quarter of an inch. Apply banana oil to the center rib to which the paper is to be fastened and to the second rib from the center, also to the rear and front spars up to the center rib. When you are sure that the paper is straight on the wing, press it down on the center rib and draw it tight from the tip of the wing and at the same time press it down to the second rib, smoothing the paper from the center of the rib toward its ends. The important point is to tighten the paper in a direction which is parallel with the wing spars, not in a direction from leading to trailing edge.

After the paper is fastened to these ribs, press the paper down to the front and rear spars. Next apply cement to the front and the rear spars and to the third rib. Draw the paper from the end over the third rib and press it down to it. When it is smooth, press it down to the front and rear spars. The next panel is done in the same manner.

Finally, when the paper is in place over the ribs, rub cement along the thread forming the trailing edge. Then press the paper down to the thread, curving it over the thread very gently and lightly. Take care with this so that the cement does not smear back along the paper surface of the wing. If this occurs, when the cement is dry, it will pull and wrinkle the paper out of shape.

The second half of the wing is covered in the same manner. Do not join the two paper surfaces at the center until all of the wing is completely covered; then apply banana oil with the end of a toothpick along the edges of the paper where they will join

at the center, and press the two edges together.

After the paper is cemented down to the framework, trim off the edges of the paper, leaving a 1/16"x1/32" border. Then smear this border, a few inches at a time, with banana oil. Curl it down so that it is well cemented to the wing edges. Proceed in this manner all along the entire front edge of the wing.

One of the features of this plane is that it may be flown with a single surface with only an upper covering on the wing, or with a wing with a double surface; that is, covered on the underside as well. The former method is best for indoor use, while the latter or double surface type wing, is best for outdoor flying. However, either one may be used indoors or outdoors. If it is desired to cover the lower surface, the same procedure is followed as when you apply the upper paper covering.

Start at the center, cementing the paper to one rib at a time and stretching the paper from the center toward the wing tips. The edges are cemented down as a last operation. When the tips are reached, the paper is stretched out to the edge of the curved wing tips and curved over the edge of the tips and cemented.

The edges are trimmed in the same manner as the upper paper covering. When the banana oil is dry (which has been used to fasten the paper to the frame), spray the whole surface lightly with water, using the atomizer. Do not "drench" the covering or the paper will contract to such an extent that the frame will be warped.

Metal Fittings

The next operation is to make the wire parts. Make them from the size wire indicated on the drawing and to the proper shape. The dimensions for these wire parts are given on the drawing, except the propeller shaft and tail skid, which are shown full size.

The wing clips should be made carefully and you should make sure that the legs of the front clip are 1/16" *shorter* than the rear ones. This is indicated in the wing clip drawing.

To mount the wing clips, press the prongs at their ends down into the spars so that the wing clip is centered accurately on the wing. Before cementing them in place, shape the clip so that it rests in the proper position on the wing. When this is done to your satisfaction, apply plenty of cement over the wing clip where it contacts the wing spars.

Next press the end of the motor tail hook down through the motor stick, bending up the end so as to hold it firmly in place. Apply cement over the parts of the hook which contact the wood.

Propeller

Making the propeller is usually a difficult task for the inexperienced. We suggest that you follow our instructions closely. First get an oblong block of light balsa 8" long, 13/16" deep and 1½" wide. Determine the exact center of the block, top and bottom, and mark the points at the center, (O in drawing). Draw circles 3/16" in diameter, using these points as the centers. Now draw lines from each corner of the block to the rims of the circles, as indicated in the drawing. (Do this on both of the wide faces of the block.)

Now you are ready to cut one blade. In the drawing, the dark line drawn between the upper left diagonal and the lower right diagonal indicates one blade of the propeller. When it is finished, cut away the upper right edge of the block, whittling along the upper left diagonal and the lower right diagonal. Make the surface between these two diagonals slightly concave. Do not cut the end of the blade round, as shown, until later. Continue the surface right out to the end of the block. Near the hub it should not be concave, but the surface should blend into the vertical sides of the hub. When both blades have been cut in this manner, shave down the back side of the blade into a convex surface, using a penknife for this purpose, sanding each surface gently after you have finished whittling, so that it is smooth.

Do not cut the convex or back surface until you have finished the concave faces of the blades down to the proper shape. Use medium grade sandpaper. The blades should be 3/16" near the hub and 3/32" at the tip. Make the thickest point of the blade at about one-third of the blade width from the leading edge, which in the drawing is the lower right diagonal.

Sand the leading and trailing edges down so that they are even and straight and not too thin. Next make the pattern of the propeller blade as shown in the graph. In the drawing it is half size. This may be done by drawing a series of squares of a quarter inch. The ones in the drawing are an eighth of an inch. Then plot out the outline of the pattern on the quarter-inch squares, marking the points of inter-

section of the outline of the pattern with the squares. When the pattern is finished, place it in proper position on the concave face of one blade. Trace around it so that the curve of the tip and the cutaway portion at the center is marked on the wood.

Do the same with the second blade. Then round the blade tips to the lines and cut away the center of the block so that the propeller hub is a half inch in depth.

When this is done, make the propeller shaft hole by forcing a pin carefully through the hub, marking a point on both upper and lower faces of the hub which is the exact center of the propeller. If you have followed directions carefully, you should have such a point on the lower face around which a circle was drawn. Now push the end of the propeller shaft through the bearing from the rear. Place two washers, B, over the end of the shaft and then pass the propeller over the shaft, the cutaway part of the hub to the rear, until from the end protrudes the amount which is equal to the length from the dotted line to the tip, as shown in the propeller shaft drawing. Bend this tip over in two right angles, as shown, and force the bent-over tip back into the propeller hub. Cover the end of the shaft where it comes into the wood with plenty of cement.

Rubber Motor

The next operation is to put on the rubber motor. This is composed of six strands (three loops) of 1/16" x 1/30" brown rubber. This rubber thread should be looped between propeller hook and the tail hook so that it is not stretched, but yet with very little slack. Tie the two ends together in a square knot. Adjust the motor so that this knot comes at the tail skid.

Now when you clip the wing in place, you are ready for a flight. The front edge of the wing should be approximately four and three-quarter inches from the front end of the motor stick. Adjust the balance of the machine by suspending it on the tips of your fingers at a point on the center wing ribs one and one quarter of an inch from the leading edge of the wing. Adjust the wing on the stick until the balance is correct.

Flying

It is advisable before you wind your motor to smear lubricant on the rubber. This will give you approximately 25 to 30 per cent more turns on the motor. Before flying the model, glide it gently. It should glide down in a steady course at about 30 degrees. Wind up the motor about fifty times and try it out, but be sure that you are not in some restricted area where there are trees, or you will have done several hours work for a very brief thrill. It is best to go to some open place with no obstructions.

For the second flight wind up the motor a little more, gradually increasing the number of winds until you wish to give the motor its full capacity. This motor may be wound up about 600 turns.

We will be pleased, indeed, if you will let us know how you like this little ship and what success you have with its construction and flight.

On the Frontiers of Aviation

(Continued from page 17)

The popular British Klemm Eagle of rather similar lines has been slightly revamped as has the Airspeed Envoy.

Two new Avro models are under construction in England. They are both twin-engined and are in a class with the Boulton-Paul transport described in the last issue. Both are low-wing planes and are of the wood and steel tube construction. No new interesting features are apparent in their design. The majority of British planes are worthy of much consideration. The English designers, without exception, are original, which is quite a tribute to any designer. All their planes are of a very original design and differ greatly from those of any other countries. These much varying lines have brought about some wonderful and interesting results such as the DeHavilland Comet, Dragon, Airspeeds, Hendy Heck and others, which England should be proud to possess.

HOW TO BUILD AN EXACT SCALE MODEL OF CLYDE PANGBORN'S LONG-DISTANCE UPPERCU-BURNELLI UB-14

Plan on Page 18

The accompanying plans show the interior as it is on the Burnelli transport, UB-14. In Clyde Pangborn's globe-girdling plane the seats will be replaced with large gasoline tanks.

If you wish to square off the plans, connect up the corresponding dots on border of plans with straight pencil lines. Each square represents two feet or four square feet.

Use balsa wood in the construction of the model. Get dimensions from plans.

The wing halves should be made first. Draw the top view of them on wood and cut with jig-saw or knife. Shape the halves down as shown in cross-sections of wing with a sharp chisel. Always push chisel in direction of the wing tips to avoid digging into the wood too far.

Make the fuselage in a similar manner. Its cross-section is shown in side elevation of plane. The pilots' cab will be made later. The fuselage should be made from a block 1⅞"x3½" and cut down as shown in the cross-section, the sides being perfectly flat. Sandpaper the wing sections and the fuselage with coarse sandpaper. Then smooth the surfaces down with fine sandpaper.

The cowls and engine nacelles may be made of one piece of wood. Ambroid a piece of balsa, large enough to shape out the cowl and nacelle, to the leading edge corners of the fuselage. The corners of the fuselage may be cut down so the pieces will fit better. Top elevation on plans shows clearly how the engine nacelles fit into the fuselage. After the ambroid has dried, begin to whittle out the two cowls and nacelles. A sharp razor blade is good for this work. Take plenty of time. The nacelles are of circular shape. Refer to cross-section A-A. Sandpaper the nose thoroughly and then begin the tail construction.

Cut the two booms or outriggers from sheet balsa with a razor blade and then sandpaper. Then cut out the two rudders, fins, and the stabilizer and elevator from the same piece of sheet balsa. Sandpaper them to smoothness and draw lines separating fins from rudders and elevator from stabilizer, pressing heavily so as to make slight groove in wood. Do the same with the ailerons and flap on wing.

The landing gear may easily be made retractable if you wish to do so. Cut out the bottom of the fuselage where the wheels are to retract as shown on plans, using a knife or chisel. Four small struts comprise each landing gear as shown. The wheels may be made or purchased. A piece of straight pin inserted through the hub of the wheel and ambroided to the struts will act as an axle. The struts should be hinged to the fuselage securely with wire. Note in plans that the four forward landing gear struts are hinged in the center to allow the retracting of the gear. Wire of a heavy grade may be used in connecting the tail wheel, which is retractable also.

Make the pilot cab next from ⅛" strips of balsa as shown in all three views. Use ambroid in making connections and cellophane for windows. Build this right on to the top of the fuselage.

Connect the wing in place next, applying plenty of ambroid. Connect the four wing struts to hold it in place. Ambroid the two booms to the tail of the fuselage and when connections have dried, ambroid the elevator-stabilizer piece in place and on top of that the two vertical tail units.

Ambroid thread between the booms as

shown in top elevation. Shape out two propellers with razor blade from scrap wood and pin these to nose.

Begin the paint job next. Give the plane several coats of gray paint or dope, dope or lacquer preferred. It is advisable to sandpaper the plane once more after the first coat has thoroughly dried and then apply three or four more coats until a perfectly smooth finish is obtained. Paint the windows on the sides of the fuselage white. The model will then be completed.

Airplane Observers Contest

(Continued from page 13)

out the coupon and mail it to the Airplane Observers Contest, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

All entries in this, the June contest, must arrive at this office by midnight, June 6th, 1935, in order to be eligible for an award.

Cash awards will be paid as follows: First place award $15; second place, $10; third place, $5; fourth, fifth, sixth and seventh places, $2.50 each; eighth to seventeenth places inclusive, $1 each. In the event of ties, duplicate awards will be made.

The names of the winners and the correct answers will appear in a following issue of MODEL AIRPLANE NEWS.

If you do not wish to destroy the magazine by cutting out the coupon, you may make and submit one of a similar size and shape, drawn in ink.

This contest is open to all except the production staff and paid contributors of MODEL AIRPLANE NEWS.

Build and Fly The Great Lakes Torpedo Plane

(Continued from page 8)

Cover the top and the bottom surfaces with separate pieces of tissue. The finished center section is doped.

The center section struts are cut to the sizes given from $\frac{1}{16}$" x $\frac{1}{16}$" and cemented to the fuselage. When dry, fashion the center section in place, using pins to hold the work in position.

Main Wing Panels

The upper and lower panels are identical. Be sure that you make two left hand panels and two right hand. The construction is the same as was followed in the center section. The curved tips are of $\frac{1}{16}$" sheet so matched that warping will not result when the covering is attempted. The first rib of each panel must be slanted to allow for dihedral. The dihedral measured at the tips is $\frac{3}{4}$". Insert small pieces of $\frac{1}{16}$" square between the first two ribs of each panel to prevent their distortion when covered.

To cover, use separate pieces of tissue for each side of each panel. The finished covering is given one coat of clear dope. The upper surface of the top wing is painted yellow. A good grade of colored dope will suffice. Three inch star insignia are used for decoration.

The panels are held in place by pins until the cement has dried. Any convenient object that can be used to temporarily support the panel during this operation will be of great assistance. The outer wing struts of $\frac{1}{16}$" x $\frac{1}{16}$" are cut to size and cemented in place. Their position is designated on the wing plan.

Cowling, Motor and Torpedo

The cowling is built up of three balsa discs $\frac{1}{4}$" in thickness. Two are cut out to receive the dummy motor. The third has a square hole cut in it to hold the plug in position. The cowling is formed as seen on the side view. The cylinders are shown in detail and are cemented in place. The crankcase is a block 1" square x $\frac{3}{4}$", shaped as shown in detail. It is detachable to permit the use of a winder. A $\frac{1}{8}$" washer is cemented to the front of the nose plug to serve as a thrust bearing. The motor details are painted black. The cowling is silver. Cement the cowling to nose block A.

The propeller is a block 8" x 1$\frac{1}{2}$" x $\frac{7}{8}$". The blank is cut as specified by the plan and the carving is done in the orthodox manner. Its careful balancing is necessary for efficiency. Pass a piece of .028 wire through the hub, bend at the front, and imbed in the propeller face. Glue a $\frac{1}{8}$" washer over the rear of the hub. Pass a loose $\frac{1}{8}$" washer over the shaft for friction. Place the nose plug on the shaft and bend the rubber hook. If the use of a winder is intended, form an S hook of .028 wire. Be sure that the propeller runs evenly and has no tendency to wobble before the motor is installed. Six to eight strands of $\frac{1}{8}$" flat rubber are used for the motive power.

The torpedo is a block 8⅛" x ¾" square, shaped as shown, cut in half longitudinally and hollowed out. The two halves are cemented together. Sand the completed torpedo and paint black. Black dope or lacquer will serve the purpose. Install the two hooks.

Flying the Model

Test the ship with a few turns at a time. As the correct balance is obtained, increase the amount of turns. A small lead weight is useful in balancing the plane. It is not advisable to hand launch your model until you are thoroughly familiar with its characteristics.

This sturdy little ship is capable of three hundred foot flights and will stand up under abuse.

Bill of Materials

8 3/32 square x 36" balsa, fuselage and leading edges of wing and stabilizer
4 1/16" x ⅛" x 36" balsa, wing spars
4 1/16" x 3/16" x 36" balsa, trailing edges, landing gear and all wing strut
2 1/16" square x 36" balsa, stringers
1 1/32" x 2" x 36" balsa, ribs and formers
2 1/16" x 3/32" x 24" balsa, main framework of stabilizer and rudder
1 1/16" x 2" x 12" balsa, wing tips, etc.
1 block 2" square x ½", nose block
1 block 8" x 1½" x ¼", propeller
1 block 8⅛" x ¾" square, torpedo
1 block 1½" square x ⅜", nose plug
1 block 8" x 3" x ¼", cowling
one ounce cement
two ounces dope
2 sheets Jap tissue
one-half ounce yellow dope
4 three inch stars
1 foot .028 music wire
3 ⅛" washers
1 pair 1½" wheels
1 scrap sheet celluloid
8 feet ⅛" flat rubber

A High Thrust Experimental Model

(Continued from page 20)

tion consisting of two ribs, front and trailing spars and two 1/16" square braces "X" as in fig. 4. Do not put in the center spar C which is 1/8x1/16" tapering to 1/16" square, until the dihedral is fixed.

Next make main sections of wing. It is best to make a full-sized layout of the wing on a drawing board and work right over it. Sand the rear spars to the shape of the trailing tips of the ribs. Sand in like manner the front spars to agree with the rib noses. Cement No. 1 and No. 12 ribs in place and, when dry, fit the intermediate ribs in. Cut the required amount off the trailing tip of each rib.

Soak a strip of bamboo 1/16x1/4x6" in water for several hours, then apply heat to bend into shape for wing tips. However, it must have heat applied after the desired shape is obtained until it stiffens so as to hold its permanent shape. Bamboo after being soaked is easier to work and hasn't as much tendency to char or burn. The two tips are then split from it. Tips are 1/32" thick. Cement the tips to the spars and bind with thread.

When wing sections are dry, cement them to the center section and imbed wire braces A and A' in the front and rear spars respectively, as shown in fig. 4. Weight the center section down on a flat true surface and block up the tips for dihedral until thoroughly dry. It is exceedingly important to have the wing true and it should have practically an equal angle of incidence throughout and this can be done when fixing the dihedral. Otherwise your plane may spiral. Before covering the wing, attach with cement and thread the four wing cleats, shown full-size in fig. 2.

Fin and Elevator

Follow the same general procedure as suggested for the wing. Make the ribs from 1/32" light sheet. No. 1 ribs of the elevator and No. 1 of the fin are braced with 1/32x 1/8" strips B placed at right angles against the center of said ribs to prevent tissue cover from bowing them. The leading edge spar of the elevator should be braced with wire where its halves intersect, similarly as A is used in fig. 2. Cover fin and elevator. Leave space on one side of elevator between No. 1 ribs uncovered, in which are cemented the tail structure support spars S. Cement the fin spar ends against the elevator spars and between S spars. Use wedges to fill out the space between them. The tail assembly is secured to the motor stick by tightly wrapping with ordinary cotton twine, but the two wire parts on this section of the motor stick are well cemented and dried before twine is used.

Make "can" fig. 1 of sheet aluminum and attach to motor stick with thread only.

Propeller

The propeller blanks may look a little unusual. The unusual shape is due to the fact that it is not an "X" prop and yet has a true pitch throughout its practical length. In fact its angle of incidence is identical throughout with a true pitch "X" type of the same diameter and pitch. Its advantages over the "X" type lie in the

greater blade area and the placing of the maximum blade width where it is considered most effective.

First make the shaft hole in the center of the block. The block is 1¼x1⅜x10½" balsa. Make the templates by tracing the drawing on tracing paper and cut tracings out. (A similar procedure can be followed on wing ribs, etc.) Using template No. 1A, draw shape on the top and bottom of block and cut block accordingly. Then mark and shape according to template 1B, using pattern on each side of each blade blank. Patterns 1A and 1B may be held in place on the block for marking, by small thumb tacks.

The blank is now ready for carving, see fig. 8. After the prop is carved from the block just described as per fig. 9, the template No. 2 is applied on the flat face (side next to motor) of each blade and they are given the final outline shown by temp. No. 2. Be sure the pattern is centered. This position is indicated for one blade by center lines "C C" fig. 9. Final shaping is now done and the camber is put in by sanding. The depth of concave camber is conveniently checked with a steel rule, see fig. 3.

Make and attach the landing gear and mount the wheels. The model is preferably doped. The motor requires about 14 strands of 1/16x1/32" rubber. If the model is built light it will fly better on less rubber.

Adjustments

A bearing arrangement is necessary whereby the thrust line is maintained in the position as shown in fig. 5. You may be able to fix up a bearing arrangement to accomplish the necessary thrust line setting, though, if desired, ready-made patented bearings can be bought which perform that express purpose for this type of model.

Referring to fig. 5, place the wing as shown. The wing will be made more rigid by tying thread or twine around the wing cleat after the wing clip is placed in it, which will thus act as a wedge between the wing and horizontal part of the wing clip. As with most high-wing stick models, the clips should be tied to the motor stick to prevent the wing-lift pulling the clips from the stick.

Before attaching the shaft in the prop, put the shaft in the bearing and adjust the latter until the shaft points flush with the trailing edge of the wing center section as shown. Then make the bearing fast with thread and cement. The wing will be in approximate balance when placed in the position as shown in fig. 5. However, *after* the thrust line is once set, the wing may be moved forward or backward without changing its angle of incidence.

The wing should be set so the model will balance at a point on the motor stick of about 1⅞" back from the leading edge of the wing, which is about the center of the average wing chord. The tail assembly is adjustable both as to angle of incidence of the elevator and directional effect of the fin. The fin adjustment need be only slight and should not be depended upon to offset inaccuracy in the wing. Now adjust

the elevator until the model glides flat and smooth, at which time it is ready for a high, wide, and handsome flight and happy landings!

Anyone having questions on this model may, if desired, address them to the Editor, MODEL AIRPLANE NEWS. However, they should include with the inquiry a stamped, self-addressed envelope for reply.

The Aerodynamic Design of the Model Plane

(Continued from page 19)

For 3/32"x1/30" strands,
$Q_{max} = 0.36(\sqrt{N^3} + 0.5N)$.
For 1/16"x1/30" strands,
$Q_{max} = 0.358(\sqrt{N^3} - 0.56N)$.
For 1/32"x1/30" strands,
$Q_{max} = 0.109(\sqrt{N^3} - 0.5N)$.

Formulae for the maximum number of turns possible to be stored in motors of *black rubber per foot of motor length* when stretched and lubricated, are:

For 1/8"x1/30" strands,
$$T_F = \sqrt{\frac{2{,}160{,}000}{N}}.$$
For 3/32"x1/30" strands,
$$T_F = \sqrt{\frac{2{,}855{,}000}{N}} + 2.5N.$$
For 1/16"x1/30" strands,
$$T_F = \sqrt{\frac{4{,}490{,}000}{N}} + 0.7N.$$
For 1/32"x1/30" strands,
$$T_F = \sqrt{\frac{8{,}260{,}000}{N}} + 6N.$$

Formulae for the amount of work in inch ounces, that black rubber motors will deliver per foot of motor length, when lubricated and stretched are:

For 1/8"x1/30" strands,
$W = (31.2\sqrt{N} - 27.2)25$
For 3/32"x1/8" strands,
$W = (22.4\sqrt{N} - 18)25$.
For 1/16"x1/8" strands,
$W = (40.5\sqrt{N} - 45)25$.
For 1/32"x1/8" strands,
$W = (22.5\sqrt{N} - 24)10$.

Values for Repeated Windings of Black Rubber

As in the case of brown rubber formulae, the *black rubber* formulae must be multiplied by constants to obtain the correct values for motors which have been wound several times. These constants are 50 percent larger for *stretched* lubricated motors than for lubricated but unstretched motors. The formulae, then, should be multiplied by the given constants as follows:

Multiply all *torque* formulae after three windings by (0.79) and after six windings by (0.71). The answer will be in inch ounces of torque.

Multiply all formulae for the maximum number of turns per foot of motor by (1.131) after three windings, and by (1.14) after six windings. The answer will be in turns per foot of motor length.

Multiply *work* formulae by (0.935) after three windings and by (0.885) after six windings. The answer will be in inch ounces of work. An example follows, worked out step by step, so you will clearly understand how to use the formulae and apply the constant for repeated windings:

Example: A motor of six strands of 1/16"x1/30" black rubber is to be used on a model. You wish to determine how many turns can be stored in it after six windings, if it is to be fifteen inches long, lubricated and stretched two and a half times its length when wound.

The formula for this kind of motor and type of winding is

$$T_F = \sqrt{\frac{4{,}490{,}000}{N}} + 0.7N.$$

In this form it gives an answer for a motor one foot long. To determine the number of turns that can be stored in the motor to be used, it is necessary to divide by (12), multiply by (15) and by (1.14). The last quantity (1.14) is the constant for six repeated windings.

The formula then appears and is solved as follows:

$$T_F = \left(\sqrt{\frac{4{,}490{,}000}{N}} + 0.7N\right)\left(\frac{15}{12}\right)(1.14).$$

(N) = 6, so dividing,

$T_T = (\sqrt{748{,}333} + 4.2)\ (1.25)\ (1.14)$.

Taking the square root and multiplying factors,

$T_T = (864.8 + 4.2)\ (1.4) = (869)\ (1.4)$.

$= 1216$ Turns. (Ans.)

For the convenience of model designers, tables are given on page 21, which show at a glance the number of turns it is possible to store in motors with various numbers, sizes, and qualities of strands. The values shown are the number of turns that can be stored per inch of motor. Values, for motors composed of a number of strands not listed, may be calculated by means of the formulae given in foregoing pages of these articles. Dividing the answer given by the formulae by *twelve* will give the number of turns per *inch* that can be stored in any particular motor.

The torque being indicative of, or a measure of the force with which the propeller is driven, tables showing the amount of torque generated by various sizes of motors and motors of various numbers of strands will be given in our next article of this series. Thus you will have a means of determining the relative driving power of these motors at a glance, and a clearer conception of the manner in which any particular propeller is using the power of a motor that may be driving it, by a comparison of the force supplied and the result obtained in flight.

Tables showing the comparative amount of work that can be stored in various motors will be given also.

In order that you have a clear idea as to the significance of turns, torque and work in the performance of a model plane, the basic facts are stated briefly as follows:

1. The torque is a measure of the intensity of energy by which the propeller is driven, and determines the speed and climb of the plane. This is true provided the same propeller is used in all cases considered.

2. The number of *turns* stored in a motor is a measure of the length of time a given propeller will continue to turn. Thus it is a measure of the duration of flight and the distance traveled *under power*.

3. The *work* that can be stored in a motor, that is, the product of the torque times the number of turns stored, is a measure of the duration of a flight, the distance traveled and the altitude gained under power. This means it is not only a measure of the duration or distance traveled under power, but of the duration and distance traveled due to the *glide* as well. The greater the altitude gained when the driving energy ceases, the greater will be the duration and distance traveled, measured from the start of the flight to the moment the plane touches the ground again. This excludes the effect of air currents and ground contours, of course.

So far in this chapter, the simple *generation* of power and significant facts concerning it have been discussed. In the second part of the chapter, starting in the next instalment, the generation of power through the means of multiple motors will be considered.

Until then, "Soft Landings."

The Glider Grows Up

(Continued from page 3)

would give them biplane strength while preserving monoplane efficiency. They tried dozens of designs, and Klemperer discovered the solution in one of the wartime designs of Anthony Fokker, which had been rejected as impractical by the German government. Fokker's design was for a biplane, but a biplane of peculiar form, without external struts or wires. The bracing was all inside the wing, which was of very thick sections, built up around two long box-spars.

Klemperer built a glider on this principle. It was a low-wing monoplane, the first genuine cantilever monoplane in the world. He called her the Rhönadler—Eagle of the Rhön—and from the day of her first appearance, she flew like a witch. After a few practice flights he took her into the 1920 gliding competition, and on his first trial, broke every existing world's record with a flight of well over a mile. That launched the cantilever monoplane. Two years later the Heinkel and Junkers firms began to produce powered airplanes on the same principle and the monoplane suddenly leaped from the bottom to the top of the heap.

At the same time, other new principles put in an appearance. The development of the auto shock-cord launching gear contributed nothing to general aviation but it was so important to gliders that it needs mentioning. The normal method of launching a glider consisted of having six or eight men take hold of the ends of a long elastic cord, at the center of which was a ring that fitted on a post at the prow of the glider; she was then towed into the air by having the men run.

The Germans found that the runners had to take a long run to get even the best gliders off the ground, while other runners had to go behind the ship to hold her tail. To eliminate this, they perfected the automatic release. The front cord remained, but it was now towed down hill by an automobile. A second cord was attached by one end to a post fixed in the ground, its other end being attached to the glider's tail with an automatic catch. When the automobile starts, this tail cord tightens up, of course. As the glider can't go forward down hill, it leaps into the air at the end of its cord, and the auto's pull now being sufficient to snap loose the automatic catch, shoots it right into the air.

More important to general aviation history was another invention Klemperer installed on the Rhönadler—"pants" on his wheels. By the time his record-breaking machine was built, Klemperer had decided that the skid landing gear was not so good. Wheels had the defect of introducing a good deal of parasite resistance, which is harder on gliders than on powered planes. He cut it down by enclosing his wheels in pants and abolishing the axle between them, a step which has since become common on high speed planes.

However, this is getting ahead of the story again. The important thing about Klemperer's ship was that it was a full-fledged soarer. Already, while he was building it, Georgii, Madelung, and Lippisch had been working out the theory of gliding and had discovered that there are two basic principles on which a glider may be constructed. The important thing about a glider is, of course, to keep down the sinking speed, or in other words, to increase the gliding angle. Now the earlier way of doing this, what the Germans call the "first principle," is to reduce the wing loading as far as possible.

All the pre-war gliders had been built on this principle; the structure was made as light as possible, the wings light (and thus necessarily with low aspect ratio, as they could not carry heavy unit loads). With a cantilever or parasol monoplane wing, this results in what might be called a "parachute glider," which drifts slowly and easily through light winds and is not too difficult for even a beginner to handle. It is worth while remarking here that this type is still the standard school machine, the primary glider, because of its simplicity and ability to fly in almost any weather.

Klemperer's Rhönadler violated this principle at every point. It had a high unit wing load, there was no particular effort to save weight and the aspect ratio was in the neighborhood of 12—yet it had broken the world's record. Georgii and Madelung set out to discover why. They found that at the cost of only a slight increase in structural weight, Klemperer had enormously reduced the drag of his glider by streamlining everything in sight—even the pilot was shut into an enclosed cabin. But they also found that the increased weight of the Rhönadler, so far from being a deficit, was actually a help. It gave her more air speed; in a high wind, she outpaced the old primary gliders two to one, and when she struck an unfavorable gust of down wind, she shot through it so quickly as not to lose much altitude. And although the lightweight glider proved capable of staying in the air longer, the Rhönadler covered much the greater distances.

Thus the two types of gliders became sharply outlined—the primary, first principle, parachute glider, which is useful for training and light wind work; and the heavy, fast, soaring machine, all streamlined in, for distance work, and soaring, a new science of which the glider experts were just beginning to realize the possibilities. The "Prüfling" or advanced training machine grew up out of combining the two—it is a soarer, but a soarer of comparatively low aspect ratio, on which the student can experiment before he takes up a real sailplane.

This was only the beginning of 1922. The glider technicians had made three enormous contributions to aviation progress—the cantilever monoplane, panted wheels, and a demonstration of the importance of streamlining and the suppression of external wires. But the biggest discoveries were still to come. You will read about these in Part 2, to be published later.

Air Ways—Here and There

(Continued from page 15)

completely streamlined, even to fillets where the wing fastens to the compressed air tank which forms the fuselage. Due to the line of thrust being coincident approximately with the line of resistance, it is a marvelous and smooth flier. Mr. Mandigo says he will try for a record with it when the weather permits.

MODEL NEWS FROM OTHER COUNTRIES

Model Aircraft League of Canada

Ted Booth of 167 Rosslyn Avenue, South, Hamilton, Ontario, one of the members of this organization, has contributed picture No. 9 of one of his microfilm baby R.O.G. models. He says, "The value of the picture lies only in its photographic merit, for it is the only satisfactory photo of a microfilm-covered ship that I have seen. It was taken under a normal afternoon light. The ship was resting on a red card-table top, (the red color of the table top reduces the glare of the microfilm). An ordinary 116 size Kodak was used, with Verichrome film. The exposure was made for five minutes through an f-45 stop opening. The wing of the model is covered with red and green film, the stabilizer with gold film and the rudder with blue film. The landing gear struts are bamboo filaments."

This information should be of great value to model builders who take pictures of their model ships. Model photography is indeed an art.

Model Aeroplane Association of Australia

Commissioner G. Hopkins of this organization writes us and tells us a few points of interest concerning activities in Australia, as follows:

"This association held its Annual Indoor Championships in January at West's Olympia Theatre, Darlinghurst, Sydney. The contest resulted in a win for P. Penny (Kensington) with a flight of 4:40, J. Sheehy (Kensington) being second with 4:37, while J. Fullerton (Bondi) filled third place with 4:31.

Picture No. 10 shows a group of club members simultaneously starting their fuselage ships into flight. Every one of these ships appears to be an excellent flier. You will note with interest the large stabilizers which have been so popular in the United States.

Model Flying Club of Australia

Mr. Freshman, General Secretary of the club, has been kind enough to send us picture No. 11 of three young model enthusiasts of the Southern Hemisphere. Left to right, they are: Ken Hawthorne from North Sydney, Arch Beaszer, a New Zealand Scout and Bill Duffecy. Beaszer is holding the Angus-Coote cup and the Wakefield Trophy. Duffecy is evidentally a MODEL AIRPLANE NEWS fan, for he is holding a copy of the August 1934 issue.

France
Escadre de la Rose des Vents

Picture No. 12 shows a model of a

Macchi-Castoldi made from plans in MODEL AIRPLANE NEWS by one of the club members. It is a very neat and carefully made job and great things are expected of it by its builder. We are pleased to state that Mr. J. Mahn has become Second Secretary of the club, Mr. Legros having resigned. All future correspondence should be addressed to Mr. J. Mahn, Escadre de la Rose des Vents, 2 Boulevard des Filles du Calvaire, Paris 11°, France.

Some of the members of the club have built the Bleriot 110, which has on several occasions flown one and a half minutes. Such flights are indicative of good workmanship and complete knowledge of model flying. This club is one of the most active in France and is making every effort to educate young boys in model flying in that country.

Club Aeronautique Francais de Modeles Reduits

This is another active French model plane club. Mr. F. Catier of 8 Rue Faidherbe, Paris XI°, is President. He tells us that it is the official French model club and controls and catalogs performance records. It is composed of many members of the larger groups of a similar nature. It appears that this organization is very much like the Junior National Aeronautic Association, which is the governing body in the United States.

This club represented France at the International Wakefield Competition last year. One of the largest contests in France was held last Oct. 7 at Vincennes. Picture No. 13 shows a group of contestants busily preparing a model for flight. There were 150 entrants and 50 prizes were given. About 5,000 spectators showed extreme interest.

Canada

Model Airplanes at the Canadian National Exhibition—1935

Model airplanes will again have a prominent part in the activities of the 1935 Canadian National Exhibition which will be held at Toronto commencing on Aug. 23. The Model Aircraft League of Canada have again sanctioned the Canadian Championships and plans are now under way to make this year's contest one of the best. There will be classes for outdoor and indoor flying scale models and also for Exhibition Scale Models. Complete details will be announced in the near future and all boys interested are asked to communicate with the General Manager of the Canadian National Exhibition, 705 Lumsden Building, Toronto, for further information.

CLUB NEWS

Ace Aeronautical Association

This is one of the most active glider clubs in the country. It is located at Midland Park, N.J. Picture No. 14 shows one of the members of the club gliding into a landing after an extended flight. Great altitudes have been attained by members of the club in all of their several machines by using the tow rope method. This method gives the glider its flying speed within twenty-five feet of the starting point. The instructor has attained an altitude of 1100 feet when using 300 feet of rope.

The junior members of this club are also active workers. At the present time they are experimenting with gliders of four to seven feet wing span. The older members are busy with the construction of a super-soarer, a two-place glider for dual instruction. Flying is carried on every day, weather permitting, during the flying season. Three of the student members have progressed far enough to take the glider up over 200 feet. Two of them are doing moderate turns.

Model Contest in Quincy

Picture No. 15 shows a group of boys who shared in the honors which they won in a recent contest sponsored by the Tenk Hardware Company of Quincy, Ill. It was a non-flying contest and the boys came through with some nice-looking jobs. The winners are:

Back row, (left to right), Bob Thompson, S. Nesbitt, Ralph Schaberg, E. Farrell and Marvin Heidbreder.

Middle row, Gilbert Helmidag, Junior Huenber.

Bottom row, (left to right), Charles Herman, Homer Pinkerton, Bob Heckenkamp, Arild Carr and Edgar Newman.

The boys showed a great deal of talent, and judging from the appearance of the models, they are "getting up in the world."

American Airplane Photo Exchange Club

This club is exceedingly active in obtaining and producing aviation photographs of

all types of airplanes. It is composed of active photo collectors all over the United States. If anyone is interested in joining this club, we suggest they write to the secretary, Mr. William Beerman of A6 Dolly Madison Apartments, Greensboro, N.C. All those who apply must have a very good collection of size 616 or 116 airplane negatives.

Picture No. 16 was contributed by Mr. Beerman and shows the latest Wedell-Williams with a 160 hp. Menasco Buccaneer engine. It is a radical departure from the regular style racer turned out by the Wedell-Williams Corporation. In many respects it is similar to the French "Caudron," which holds the world's record.

NOTICES

Eddie Gensler of Route No. 3, Monroe, Mich., wishes us to insert the following notice: "I have in my possession a model which was found by a friend of mine on U.S. Highway 23 a few miles north of Toledo, Ohio. The following address was found in the box: Mr. Charles Wilcox, 510 West Union Street, Champaign, Ill. I have written to this address and the letter was returned to me. The model is a white biplane with black cowling and pants." Will anyone who knows where the owner may be located please write to Mr. Gensler?

Correspondents

Will some of our readers please correspond with the following boys? They promise to answer all letters.

Henry I. Rosenberger, Secretary of Albany Aeronautic Association, 111 Benson Street, Albany, N.Y.

Michael Matchin, 305-7 South Second Street, Apartment 31, Brooklyn, N.Y.

Slipstreams

(Continued from page 22)

throughout x 1½" wide and 4" or more long. Piece C (the table or rest for the sheet balsa) is made from ½" thick x 1½" wide and is 4" or more long.

"Now get one Gillette type (double-edged) blade, place it between B and C wood pieces, slanting it at about thirty or forty degrees with the high edge to the rear, or as shown on diagrams. Now drill five holes size 3/32" through all three wood pieces. Two holes are drilled on each end of the pieces and one hole in the center, about ¼" down from the top. The bolt that goes through the center hole, holds the razor blade firm so that it will not slip. All bolts are tightened as tight as possible, first being sure the razor blade is in the right place between wood pieces B and C.

"Now make the tension spring. Bend it in such a way that when the prong is fastened in piece A, the spring or loose end will press tightly against piece B. The bamboo piece is shaped as shown and is slipped under the tension spring. It is used to prevent the tension spring from creasing the balsa wood strip.

"When using the stripping tool, hold it in your left hand. Take the sheet of balsa wood with your right and lay one end of the balsa sheet on the table (pieces B and C). Pull the sheet toward you at the same time pushing it slightly against the side wall piece A.

"If this tool is made with a little care it will cut very good strips of balsa wood. I would not, however, advise cutting sheet balsa thicker than one-quarter inch as the upper part of the razor blade would begin to bend and would not make a square cut.

"As said before, piece B may be made of a different thickness and slipped in place. Therefore, any size strip may be cut with a fair degree of accuracy. The tool should be made from wood that is hard. Pine and spruce will give good results. Balsa wood should not be used, as it is not strong enough.

"I would like to hear from those who make this tool, giving their ideas on it. Any improvement will be greatly appreciated."

We would appreciate any comments from those who build this tool, as Mr. Lee requests.

Another very useful idea comes from Jack Dettis. This should be of value especially to those who are building solid or detail scale models. He says:

Making Fillets

"Recently I built a Waco, in which I embodied a new feature to make fillets, which I believe would be of value to model builders. I made this by powdering up ordinary laundry starch and mixing it with clear dope. It handles easily and works into a smooth surface fillet. Try it."

We would appreciate hearing from you concerning your success with this suggestion. We brand this as an excellent idea, insomuch as balsa wood and clear dope

are hard to mix for use as a fillet, while starch mixes with dope to create material which is easily worked and which is very light.

Something New For Beginner or Expert

(Continued from page 7)

Letter O marks the center section points where the wing is cracked slightly to get the dihedral. Moisten the wing slightly with warm water along the line shown by P. Bend the entire wing carefully until the right curvature is obtained, as illustrated by M.

Apply a little cement over the middle line of the wing and place the wing underneath the fuselage, making sure that it is centered. Place two model-making pins underneath the wing, extending part way into the fuselage, both near the leading and trailing edges. This will serve to hold the curve of the wing until the cement has dried. Then remove the pins. Now, with a slit made ever so lightly on the center section lines, shown by 0 of the wing, raise each tip upward until it is 3/16" above the work table. Apply cement both above and below the wing very lightly.

The white line shown on the elevator, C, marks its exact center and is where cement is applied when it is placed in the elevator slot, L. The rudder, D, is next glued in position as shown by the dotted lines. The tail skid, G, next cemented into position, is shown also by dotted lines.

The landing gear pants, F, of which two pieces were made, are cemented directly below the wings' center section lines. The top of the wheel pants you will notice, is curved and fits snugly into the underside of the cambered wing. The dotted vertical lines beneath the side view drawing of the fuselage show the position of the landing gear when attached. The radio mast, E, is cemented to the fuselage as shown by the dotted lines.

The propeller, K, is not necessary to the model. When hand-launching the glider, however, a spinning prop may be attached to give a realistic touch. It is not used when launching by sling-shot.

For the nose weight, the writer has found that lead foil serves the purpose best. It is easily bent in any direction and little portions can be ripped off to reduce the weight. It holds well to the balsa when cemented. Obtaining the best gliding angle is a matter of experimenting with the weight and can be determined in a few minutes. If you decide to paint the model, I suggest that this be done before the nose weight is attached because the paint will add to the weight of the model.

The following is the color scheme. Entire ship including the vertical fin is aluminum. The rudder is red, white and blue. Blue, shown by dotted lines, is nearest the vertical fin. Regulation stars on top and lower surfaces of wing. U. S. NAVY on both sides of fuselage. Outline window frames in black.

Cement a strip of white thread from the radio mast to the top part of the rudder as shown in the picture of the model. The little ship is now ready to fly, or act as a realistic unit for your model airport.

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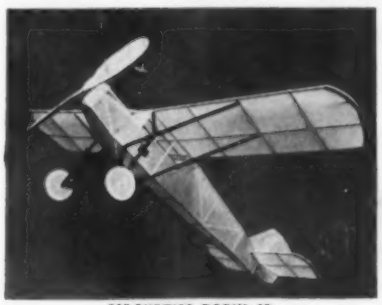

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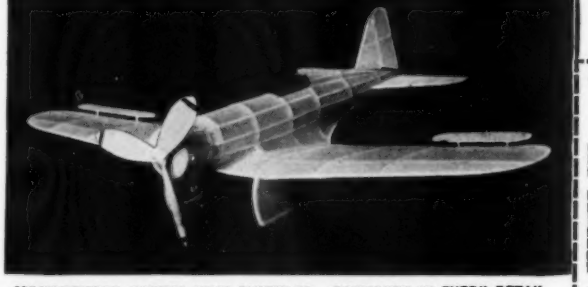

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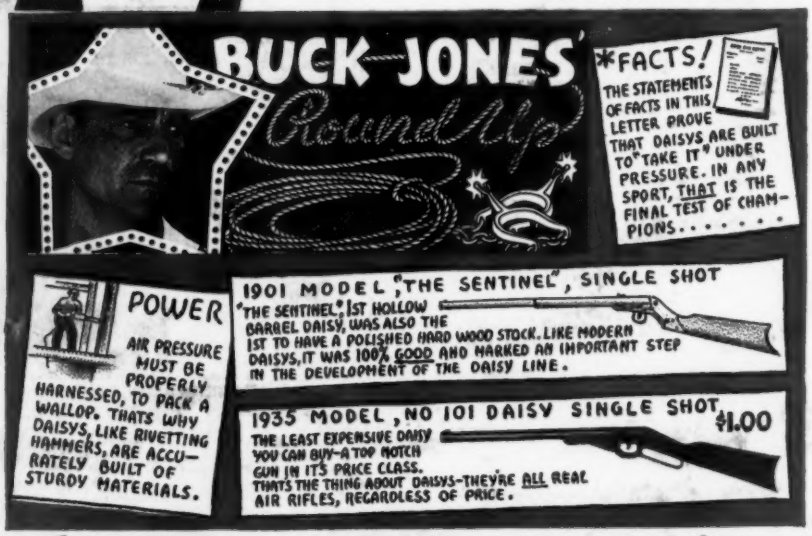
*****(*These figures are furnished by Mr. Frank W. Farnsworth, Executive Secretary of the International Air Rifle League.*)



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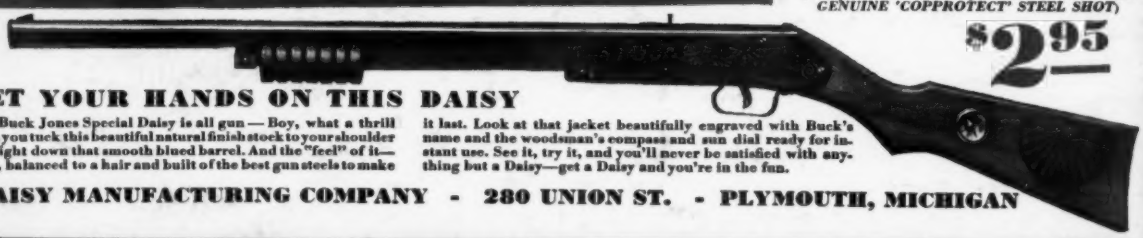

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